

FLIGHT

First Aero Weekly in the World.

Founder and Editor: STANLEY SPOONER.

A Journal devoted to the Interests, Practice, and Progress of Aerial Locomotion and Transport.

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CONTENTS.

	PAGE
Editorial Comment :	
Soothing the German Masses ...	585
And National Insurance: ...	586
German Adaptability to Circumstances ...	586
Aircraft Work at the Front. Official Information ...	588
The "X" Aircraft Raids ...	588
The British Air Services ...	589
The Aeroplane Compass. By "Guidance" ...	590
Royal Aero Club. Official Notices ...	593
From the British Flying Grounds ...	593
Flying at Hendon ...	594
The Roll of Honour ...	595
The Aeromarine Aviation Motors ...	596
Eddies. By "Æolus" ...	598
Aircraft and the War ...	601
Models ...	603
Imports and Exports, 1914-1915 ...	604

EDITORIAL COMMENT.

Soothing the German Masses.

It is perhaps but coincidence, but generally when enthusiastic confidence in the progress of events appears to be ebbing low at home with the masses of the German people a fresh Zeppelin raid upon British "fortified" towns is announced. Evidently it is regarded by the German High Command as an infallible cure for downheartedness, and it will be interesting to hear the official "wireless" version of the latest effort in this direction, in view of the details issued by our Admiralty of the woman-killing attack carried out by the enemy dirigibles during Monday night last. The laming of one of the five pirate vessels composing the squadron, and the subsequent smashing up of this winged mammoth by our flying officers and the French aviators, must force upon the instigators of these raids serious consideration whether it is worth while. True, they have been the means of reducing the personnel of our Royal Naval Air Service by one officer, who might otherwise have lived to help deal out to them in daylight some effective blow through the air, and in addition they have the "honour" of having further added to their list of innocent victims, killed, 1 man, 9 women and 4 children; wounded,

5 men, 7 women and 2 children—hardly an achievement to be superlatively proud of in the circumstances. Evidently the empty and bootless "walk-over" into Warsaw has fallen flatter with the general community than even the Allies could have hoped, especially followed, as it was, by such a clumsy and abortive attempt at rushing through a separate peace with Russia proposition as was put forward "unofficially." The contemptuous rejection by Russia of this cunning attempt to undermine the solidarity of the *Entente* arrangements to fight to a finish, coupled with the indignant reception accorded the hopeless and fraudulent agitation once more set going in America by German agents, has had to be glossed over by some means. What so ready to hand as another night "cut-and-run" attack upon the much "strafed" British enemy, the result of which lends itself to infinite elaboration to suit the plans of the wirepullers in quieting down the doubts of the German nation, which at the finish will have to foot the bill for all these piratical episodes. How it is endeavoured by means of the all-powerful airfleet to impress neutrals is very well illustrated by the front page of a Philadelphian newspaper, THE SUNDAY TIMES, of July 4th. In this they published a "War Extra" with the illuminating headlines in huge type announcing "London in flames. City is bombarded by 200 Zeppelins." It hardly seems credible that any newspaper in the world could lend itself to publishing such obvious balderdash, but it is still as true as ever, that if you only throw mud enough and lie sufficiently well, something must stick somewhere. In this case Philadelphia seems to have got the brunt of the lie Bureau's tactics. In their legitimate use in warfare there should be plenty of scope for utilising to their utmost value the German airfleet units, and however we might regret such power to use, no exception could be raised to their utilisation in the direction naturally open to them. This phase of their utility is hinted at, as being also in operation, in a communication from Rotterdam in which it is stated that Dutch trawlers returning to home ports on Tuesday reported several Zeppelins west of Heligoland, apparently covering the movements of warships. This may or may not be a fact. It is to be hoped that it indicates some renewed "liveliness" in the North Sea, although we fear very much there is little chance at present of any coming forth for battle on the part of the German Grand Fleet, in spite of the help which the Zeppelins are credited with being able to supply. The whole conception of these air-raids is a horror from first

to last, as it cannot for one moment be suggested seriously that they possess the smallest military value, and although we have felt constrained to placard them from time to time in strong terms, we have done so in good company, for papers like the *TIMES*, *DAILY TELEGRAPH* and other leading dailies have, if anything, been more condemnatory in their language than ourselves. That we are not over-prejudiced in this direction may be perhaps gathered from the very sympathetic leader which appeared in the *DAILY TELEGRAPH* of Wednesday this week, upon the subject of the latest outrage, the main portion of which is as follows:—

"It is worth noting that the strange chance which has associated all these raids with the murder of women and children especially is still in operation. Of the killed, one only was a man. It may be remembered that in the last air raid of which extended particulars were published by the Press Bureau—that of June 6th, on the north-east coast—out of twenty-four killed, only five were men, all of them civilians. Furthermore, since the last raid the Government have informed the House of Commons that in all the fourteen attacks which had then been made by German aircraft on this country, twenty-four men—civilians every one—had been killed, to twenty-one women and eleven children. In the whole record of senseless assassination not one single combatant has been killed, and not one single place of military character has been so much as damaged. That is the truth about the German aircraft raids in a nutshell. By the very nature of the case, they must murder blindly. They dare not come by daylight; the dare not even come by night unless it is fully dark, as it was on Monday night, so as to afford the maximum chance of escape from our aeroplanes and guns. The whole foul business is of a kind to sicken the very soul of any man with the faintest spark of military honour in him. It is born of a mere blood-lust, a cannibal appetite for simple slaughter, with an added delight in the helplessness of the victims which is perhaps the most repulsive of all the symptoms of moral degeneracy. Those were the feelings which, quite openly and shamelessly, were manifested in all the popular jubilations in Germany over what Zeppelins were expected to do when war broke out.

"It is no longer possible to doubt, we think, that the existence of this sort of sentiment in the German public, or a considerable part of it, is the true *raison d'être* of these otherwise meaningless murder-raids. To those who give the orders for them it has long been clear that their chance of effecting anything in the military sense is practically *nil*, in the conditions under which they must necessarily be made. It must also, by this time, be clear to those of them who are capable of reflection that, even regarded as mere "frightfulness," these attacks have an effect precisely the contrary of that they were once expected to produce. What can be said for them from the point of view of the enemy Government is that they please the public more than anything else, short of real and resounding triumph in the field; and it has repeatedly been noted that an air-raid on our coasts has been launched at a time when disappointment and depression were to be feared among the civilian population in Germany."

What a contrast was the raid of our French allies upon Saarbrücken on Monday, the same day as the fresh German murder raid, with their squadron of 32 bombardment aeroplanes, which succeeded in "placing" some 164 shells during their visit. This succeeded so well, no doubt, by reason of the improved tactics which accompanied the attack, of an escort of fighting aeroplanes to tackle any enemy machines which might endeavour to baulk our allies in the object of their bombardment. Apparently four of the squadron met with mishaps in some form, as that number is reported as not having returned, and in a measure their disappearance is accounted for in the German *communiqué*. But this is a small price to pay for the actual damage done plus the great moral effect of the raid.

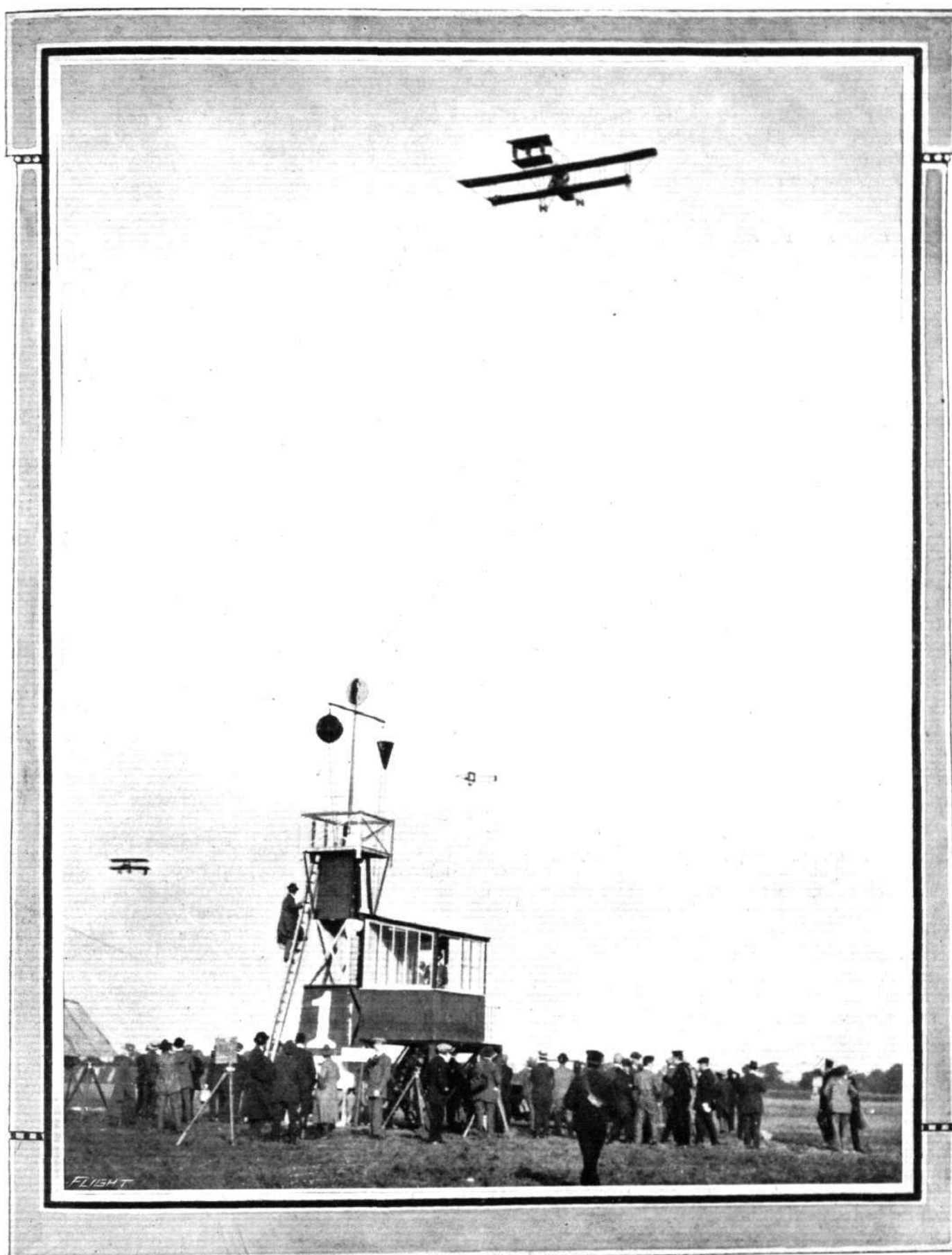
And National Insurance.

In all probability one material effect of Monday's Zeppelin visit will be to bring in a rush of insurance business to the Government scheme. Unfortunately there is a fair sprinkling of people who think the premium too high by far, and who prefer therefore to remain out. From

a personal point of view we agree that *much* lower rates could have been put into force with very little risk of loss. This rate could have been such that three-quarters of the people would probably have paid up and cast aside any little worry that might have existed as to being uninsured. It was either that or the Government should have taken over the indemnification as a national liability. As it is, there is still likely to be a handsome profit to go to the war costs, and, after all, that is something to be thankful for. At the same time it would have been a much greater cause for satisfaction to have garnered in all the premiums from the big establishments and public bodies, such for instance as the Metropolitan Asylums Board, who at their meeting last Saturday decided to carry their own risk in regard to their three millions, there or thereabouts, of buildings.

German Adaptability to Circumstances.

From every reliable source it has been month by month increasingly evident that the Allies' airfleets have entirely mastered the German efforts at ascendancy in the air. Whatever we may think of the German beast as a creature outside the pale of civilisation, as a consequence of his hellish methods in the conduct of his aggressive war, we must admit the phenomenal gift for adaptability which he possesses, when circumstances require that he should alter his existing and preconceived plans so as to meet and if possible overcome any altered position of affairs which may have rendered nugatory his organisation against us. By certain information which has been coming through recently, and especially by latest facts which are materialising, the Germans have been directing very great energies towards an effort to regain if possible the control of air reconnaissance and attack, which up to the present has passed from them. They have long ago realised that larger aeroplanes, high-powered engines and bigger armament would probably be the most effective answer to our offensive, and it is more and more evident that it is upon these lines they have proceeded. That our own aviation departments are keeping in touch with any such new departure we do not doubt, and we have little fear that our enemy will have but a short-lived run for his efforts, directly our side lets go in the same direction. In the meantime the menace is undoubtedly one to be reckoned with. We shall await with confidence for the counter-move of our Flying Services, as although the German scientists and designers may bring forth highly-efficient mechanical engines of war, they have not as yet learnt the secrets of nature, whereby they can with equal ease produce at their sweet will pilots capable of handling their machines as effectually as those of British and French mould. This is altogether a more subtle problem, and at the finish, as at the first, is the factor which is going to win. In connection with this all-important progress, which is so apparent in communications from the front of late, we commend to our readers a most instructive article from the pen of Mr. H. F. Prevost Battersby, which appeared in the *MORNING POST* this week, and which in the main we reproduce on another page of this issue. Under the existing censorship there are so many "Defence of the Realm Act pitfalls" for innocent journalists to fall into in regard to giving information likely to be of service to our enemies, that it is quite refreshing to come across so informative an article as this of Mr. Battersby, which has been allowed to see the light of day.



A REMEMBRANCE OF HENDON BEFORE THE WAR.—A trio in the air. Note on the five-seater the men being carried on the wing tips.

AIRCRAFT WORK AT THE FRONT.

OFFICIAL INFORMATION.

THE following note was officially issued in Paris on the 5th inst. :—

"One of our aeroplanes was forced, in consequence of motor trouble, to land near Moulin-sous-Touvent in our lines, at a short distance from the enemy's lines. The machine no sooner landed than it caught fire. The aviators are safe."

In a *communiqué* issued in Paris on the 5th inst., it was stated :—

"On Tuesday and Wednesday a French battleship and two cruisers, with torpedo boats, mine-sweepers, and an aeroplane ship, made a demonstration before Sighe-Dajik and Scalanova, on the coast of Anatolia."

In the *communiqué* issued in Paris on the afternoon of the 6th there was the following :—

"Two German aeroplanes threw about ten bombs on Fraize, in the valley of the Meurthe, which killed two women and a soldier."

The following note was officially issued in Paris on the 6th :—

"There have been no striking facts to report at the Dardanelles since the beginning of August. There have been intermittent artillery duels and great activity among the aircraft."

The following note was officially issued in Paris on Saturday :—

"The Germans have been trying to destroy two Allied waterplanes off Nieuport (Belgian coast) by means of big calibre shells. Our artillery has rapidly reduced the hostile batteries to silence. One of the waterplanes returned under its own power; the other was towed to shore undamaged."

In the *communiqué* issued in Paris at midnight on Monday there was the following :—

"This morning a squadron of thirty-two bombardment aeroplanes, escorted by aeroplanes for pursuit purposes, left to bombard the station and the factory of Sarrbrück. The atmospheric conditions were unfavourable, the valleys being shrouded in mist and the sky cloudy. Nevertheless, notwithstanding the difficulties of finding the direction, twenty-eight aeroplanes reached the goal, and dropped on their objectives 164 shells of all calibres. The escorting aeroplanes kept off the Aviatiks which attempted to bar the way to the squadron. Numerous columns of smoke and fires were observed above the points aimed at."

In a communication issued in Paris on Monday, and correcting certain statements in the German *communiqués* from August 2nd-7th, there was the following :—

"AVIATION.—No French aeroplane has been shot down by the German artillery."

In the midnight *communiqué* issued in Paris Tuesday there was the following :—

"Four of our aircraft which took part in the bombardment of Saarbrück have not returned to our lines. One of them is reported to have landed in Switzerland, near Payère, in the canton of Vaud."

The official *communiqué* issued in Petrograd on August 9th, in reporting the naval attack on the Gulf of Riga stated :—

"Our seaplanes by throwing bombs contributed to our success."

In an official Note on the subject issued later, it was stated :—

"Seaplanes as well as warships took part in the action to repel the enemy, whose attacks were repulsed."

Communiqués issued in Rome on the 6th inst. stated :—

"On Thursday night one of our airships bombarded the enemy's camp around Lake Doberdo (Carso Plateau) and, although fired at by the hostile artillery, returned undamaged to its base."

"Another airship effectively bombarded the railway line from Opicina (about four miles north of Trieste). On its return it was attacked by an Austrian seaplane which dropped three incendiary bombs at it from above but was put to flight by the fire of the airship, which returned undamaged to our lines."

"One of our dirigibles last night dropped bombs on Pola, where repeated incursions had been made with good results. For reasons which it is not possible to ascertain the airship fell into the sea. The crew, composed of three officers and three men, are safe, and have been made prisoners by the Austrians."

The following semi-official statement was issued in Nish on the 4th inst. :—

"On the morning of August 2nd one of our batteries in the fortifications of Belgrade engaged an enemy howitzer battery posted on the heights of Rejanja. One of our aviators was very successful in directing our fire, the accuracy of which was very marked. The enemy battery, whose shelters we destroyed, was reduced to silence. Two other enemy field batteries fired fifty shells at our aeroplane, without success. Some of our aeroplanes successfully dropped twenty-six bombs on the enemy aerodrome at Bavaniste."

THE "X" AIRCRAFT RAIDS.

IN view of the decision of the Government not to allow details of aircraft raids to be published we are as before (see issue of June 11th, 1914) giving to each one an index number. Eventually, when details are available, we shall give the respective information under these index numbers, which will facilitate easy reference to each particular raid.

The following announcement has been issued by the Admiralty, the date in the brackets indicating when the statement was issued :—

"X₄" Raid, August 9th (August 10th).

A squadron of hostile airships visited the East Coast last night and this morning between the hours of 8.30 p.m.

and 12.30 a.m. Some fires were caused by the dropping of incendiary bombs, but these were quickly extinguished and only immaterial damage was done.

The following casualties have been reported :—

1 man, 9 women, and 4 children killed.

5 men, 7 women, and 2 children wounded.

One Zeppelin was seriously damaged by gun fire of the land defences, and was reported this morning being towed into Ostend. She has since been subjected to continual attacks by aircraft from Dunkirk under heavy fire, and it is now reported that after having had her back broken and rear compartments damaged, she was completely destroyed by explosion.

The night was extremely dark, accompanied by thick fog in places, which rendered night flying by aeroplanes very difficult.

It is regretted that Flight Sub-Lieut. R. Lord, who was one of the pilots sent up to engage the enemy, was killed on landing in the dark.

The French Ministry of Marine issued the following statement on Wednesday:—

"French hydroplanes from the maritime aviation centre at Dunkirk yesterday dropped 12 incendiary bombs of 120 mm. and six of 90 mm. on a Zeppelin which was returning in a crippled condition to Ostend. They further carried out the bombardment by night of the port of Ostend, on which they dropped 49 bombs of 90 mm.

THE BRITISH AIR SERVICES.

Royal Naval Air Service.

THE following appeared among the Admiralty announcements of the 5th inst.:—

Petty Officer Mechanic K. C. Buss promoted to the rank of Probationary Flight Sub-Lieutenant, for temporary service, with seniority of July 15th, and appointed to "President," additional, for R.N.A.S.

The following appeared among the Admiralty announcements of the 6th inst.:—

The following have been entered as Probationary Flight Sub-Lieutenants, for temporary service: F. H. Smith, with seniority of July 12th; C. G. Knight (temporary Sub-Lieutenant R.N.V.R.), with seniority of Aug. 5th; and C. J. Hallinan, with seniority of Aug. 7th, all appointed to "President," for R.N.A.S.

Temporary commissions have been granted to the following: A. J. O'Reilly, as Lieutenant (R.N.V.R.), with seniority of July 29th; and E. G. Hopcraft (Ordinary Telegraphist), as Sub-Lieutenant (R.N.V.R.), with seniority of July 12th, and both appointed to "President," for R.N.A.S.

The following appeared among the Admiralty announcements of the 7th inst.:—

Arthur R. Layard, granted temporary commission as Lieutenant, R.N.V.R., and appointed "President," additional, for R.N.A.S. To date Aug. 6th.

Alfred S. Goodwin, entered as Acting Flight Lieutenant, for temporary service, and appointed "President," additional, for R.N.A.S. To date Aug. 5th.

The following appeared among the Admiralty announcements of the 9th inst.:—

J. Carmichael granted temporary commission as Lieutenant, R.N.V.R., and appointed to the "President," additional, for duty with R.N.A.S. To date Aug. 7th.

L. Scott, H. Worrall, H. Francis, I. Clarke, R. Slade, H. Wood, G. Leather, C. Mullins, A. Watkins, D. Bremner, and I. Campbell all entered as Probationary Flight Sub-Lieutenants, for temporary service, and appointed to the "President," additional, for R.N.A.S.; to date Aug. 14th. A. Ince, D. Hay, and G. Gooderham all entered as Probationary Flight Sub-Lieutenants, for temporary service, and appointed to the "President," additional, for R.N.A.S.; to date July 13th. B. Cross and J. Beddard entered as Probationary Flight Sub-Lieutenants, for temporary service, and appointed to the "President," additional, for R.N.A.S.; to date Aug. 7th.

Temporary commissions have been granted as Lieutenants, R.N.V.R., to J. Potter, E. Hotcker, R. Brook, E. Wright, and H. Warburton, and appointed to the "President," additional, for R.N.A.S. To date Aug. 7th.

Temporary Sub-Lieuts. M. Gill and W. Pigott both entered as Probationary Flight Sub-Lieutenants, for temporary service, and appointed to the "President," additional, for R.N.A.S.

G. Yerburgh, temporary commission and appointment as Sub-Lieutenant, R.N.V.R., terminated. To date Aug. 7th.

H. Weaver granted temporary commission as Sub-Lieutenant, R.N.V.R., and appointed to the "President," for R.N.A.S. To date Aug. 7th.

Temporary Sub-Lieuts. (R.N.V.R.) N. Sladden to the "President," additional, for R.N.A.S.; to date Aug. 7th. Joynson to the "President," additional, for R.N.A.S. Armoured Car Aeroplane Support; to date Aug. 7th.

The following appeared among the Admiralty announcements of the 10th inst.:—

F. B. Sutton has been entered as Warrant Officer (Second Grade)

Mrs. Albert Lord, of Felton, Northumberland, mother of Flight Sub-Lieutenant R. Lord, killed during the German air raid on the East Coast, has received the following telegram:—

"The King and Queen deeply regret the loss you and the Navy have sustained by the death of your son in the service of his country. Their Majesties truly sympathise with you in your sorrow."

At the inquest held on Wednesday, a verdict of accidental death was recorded, and Dr. Hardman expressed, on behalf of the Admiralty and the Royal Navy, particularly the Royal Naval Aerial Service, their deep regret at the death of so gallant an officer and loyal comrade. They felt that his death was a loss to the country as well as to the Navy itself.

for temporary service, with seniority of Aug. 9th, and appointed to "President," additional, for R.N.A.S.

Royal Flying Corps (Military Wing).

THE following appeared in a supplement to the LONDON GAZETTE published on the 5th inst.:—

Deputy Assistant Director of Aviation.—Capt. (temp. Major) Phillip W. L. Broke-Smith, R.E., and to retain his temporary rank whilst so employed; March 26th, 1915.

Flight-Commander.—Capt. (temp. Major) Hugh L. Reilly, 82nd Punjabis, Indian Army, and to retain his temporary rank whilst so employed; April 9th, 1915.

Equipment Officer.—Sec. Lieut. Wilfred R. Wills, Indian Army Reserve of Officers, and to be temporary Captain whilst so employed; March 26th, 1915.

Flying Officers.—May 1st, 1915: Capt. Henry Petre, Australian Permanent Forces; Lieut. William W. A. Burn, New Zealand Staff Corps. May, 11th, 1915: Capt. Thomas W. White, Australian Citizen Forces; Lieut. William H. Treloar, Australian Citizen Forces. Lieut. George F. Merz, Australian Flying Corps; June 5th, 1915. Lieut. Thomas R. Wells, 33rd Punjabis, Indian Army. June 7th, 1915. Sec. Lieut. Edmund J. Fulton, 1st Duke of York's Own Lancers (Skinner's Horse), Indian Army; June 26th, 1915. Lieut. Alan H. Morton, R.A., and to be seconded; July 20th, 1915. July 22nd, 1915: Sec. Lieut. H. H. Kitchener, R.E.; Sec. Lieut. D. A. L. Davidson, Special Reserve; Sec. Lieut. H. S. Ward, Special Reserve.

Supplementary to Regular Corps.—The notification of the appointment of Herbert A. Johnston to a Second Lieutenancy, which appeared in the GAZETTE of June 21st, 1915, is cancelled.

The following appeared in the LONDON GAZETTE of the 6th inst.:—

Flying Officer.—Second Lieut. (now Lieut.) Bentfield C. Hucks, Special Reserve. Aug. 12th, 1914.

Supplementary to Regular Corps.—To be Second Lieutenants (on probation): Claude H. Friese-Greene; July 1st, 1915. John C. Slessor; July 6th, 1915. Exley L. Millar; July 15th, 1915. Norman G. McNaughton; July 21st, 1915.

The following appeared in a supplement to the LONDON GAZETTE issued on the 7th inst.:—

Supplementary to Regular Corps.—R. Yates to be Second Lieutenant (on probation). July 21st.

The following appeared in a supplement to the LONDON GAZETTE issued on the 9th inst.:—

Supplementary to Regular Corps.—Second Lieut. (on probation) Herbert A. Oxenham is confirmed in his rank.

The following appeared in the LONDON GAZETTE of the 10th inst.:—

Flying Officers.—July 20th, 1915: Capt. J. A. Liddell, 3rd Batt. (Reserve) Princess Louise's (Argyll and Sutherland Highlanders), and to be seconded. Second Lieut. J. G. McEwen, Special Reserve. Second Lieut. D. A. Glen, Manchester Regt., and to be seconded; July 24th, 1915.

Temporary Quartermaster, with the Hon. Rank of Lieutenant.—July 30th, 1915: George E. Stagg.

Central Flying School.

THE following appeared in a supplement to the LONDON GAZETTE issued on the 5th inst.:—

Instructor.—Capt. George B. Stopford, R.A., a Flight-Commander, vice Lieut. (temporary Capt.) A. H. L. Soames, 3rd (King's Own) Hussars, deceased. July 22nd, 1915.

THE AEROPLANE COMPASS.

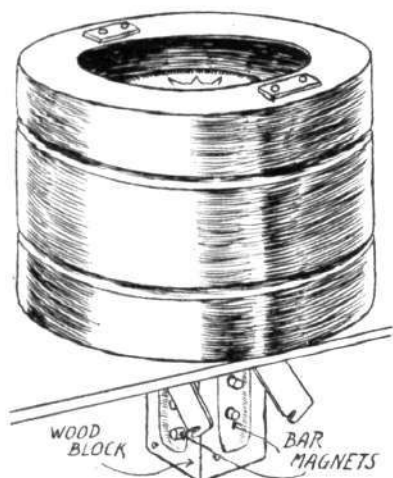
By "GUIDANCE."

WITH the increasing frequency and distance of aerial raids mostly over unknown country, the means available for use by our pilots in setting and maintaining a true course assumes a greater importance than ever before, and a few notes regarding that modern pathfinder, the aviator's compass, should therefore be of interest to the readers of *Flight*. Let it be understood at the outset that the subject is of such a nature that in an article like the present it can only be dealt with in an elementary way, and that its object is to help those who are not familiar with the general principles of the compass to an understanding of the fundamental idea of its construction and use.

Briefly, the magnetic compass in its simplest form consists of a magnetised bar of steel suspended from its centre, the earth's magnetism causing the bar, or needle as it is generally called, to point to the magnetic poles of the earth. To be of any use on board a ship or an aeroplane, however, a considerably more complicated arrangement is necessary, and the various types of compasses in use, however much they may differ in detail design, may be classified under two headings: the dry card and the liquid type. The former sometimes con-

to be made liquid tight and provision made for allowing of expansion and contraction of the liquid. Disregarding differences in detail design according to individual makers, the liquid type of aeroplane compass consists essentially of a small metal float to which the magnetic needle or needles are fixed and on which also the compass card is mounted.

Surrounding this float is a larger reservoir containing the liquid. In this connection it should be pointed out that the reason for leaving a considerable space between the edge of the compass card and the sides of the container depends on the well-known phenomenon that when a receptacle containing a viscous fluid is suddenly rotated the portion of the liquid nearest the walls will rotate with it whilst that in the centre will remain undisturbed for an appreciable period unless the receptacle be kept rotating in the same direction for some considerable time. The float, which sometimes takes the form of an air-filled dome in the centre of the compass card, is made of such a size that it will almost but not quite support the magnetic needles and the card, the remainder of the weight being taken by a central pivot tipped with some hard alloy ground and polished to a very fine point in



On the left a modern aero compass card, and on the right an older type of ship's card. The sketch in the centre shows the wood block underneath the compass, in which are inserted the bar magnets used for correcting the deviation.

sists simply of a magnetic needle pivoted on a steel centre, and contained in a casing, on the bottom or sides of which are marked the cardinal points N., E., S., W., and the quadrantal points, N.E., S.E., S.W., and N.W.

Another form of the dry card compass has the card attached to and turning with the needle. The fixed point on the outer casing or a line on the glass covering, termed the lubber point and the lubber line respectively, indicate the course, and the points are arranged to give direct reading.

Although the dry card type of compass is extensively used for surveying and similar purposes for which it is especially suitable, as it can be made extremely accurate and delicate, it would be practically useless on board an aeroplane, since it takes a considerable time to come to rest and is seriously affected by vibration or any form of movement. One purpose for which the dry card compass may be advantageously employed is for laying out the cardinal and quadrantal points on the ground, from which, as will be explained later, the aeroplane compass is adjusted.

Compasses of the liquid type are a good deal more complicated, chiefly owing to the fact that the bowl has

order to reduce to a minimum the friction between the point and the jewel in the centre of the card.

Like those employed on board ship, the aeroplane compasses are invariably gymballed so as to keep the card always in a horizontal position, no matter what the attitude of the machine. The gymballs take the form of two rings each pivoted on two points 180° apart, but the points on one ring being 90° from the points of the other.

As any vibration is likely to have a highly disturbing effect on the compass, some form of anti-vibrational arrangement is always provided. This may consist of a light metal case surrounding the compass bowl, the space between the bowl and the outer casing being filled with a shock-absorbing material as, for instance, horse hair. Another method which is used to supplement the one previously mentioned, is to sling the compass from elastic bands or interpose rubber pads between the compass and the rigid portion of the aeroplane on which it is mounted. It will be found occasionally that at certain engine speeds the needle will swing in sympathy with the vibration, with, of course, detrimental result to the utility of the compass. The remedy for this is to alter the tension on the rubber.

Turning now to the method of marking the compass card, this is somewhat different from that usually adopted for nautical compasses, due, mainly, to the difficulties of keeping an aeroplane dead on its course for any length of time in anything short of a flat calm. Two of the accompanying sketches show typical marine and aero compass cards. Like the former the card of the aeroplane compass is usually divided into 360° , of which only every fifth is marked, and every tenth numbered, it being almost impossible to steer with greater accuracy. The sequence, however, of the numbering is different in the two cases. From the illustration of the ship's compass card, it will be seen that the numbering runs from 0° at N. to 90° at E., and then downwards again to 0° at S. The aero compass, on the other hand, is marked progressively round so that E. becomes 90° , S. 180° , and W. 270° — N. being 360° . In addition to the numbers the cardinal points and quadrantal points are given. The advantage of this method is that it is extremely easy to remember, there being no question as to whether a certain course is N.N.W. — $\frac{1}{4}$ W. or N. by W. — $\frac{1}{4}$ W.

In some cases when it is desired to place the compass so high up on the instrument board that it would be difficult for the pilot to look directly on the compass card, a small mirror is placed above the compass and on the side farthest away from the pilot, who then watches the reflection in the mirror instead of the compass card itself. Frequently a small prism is employed in place of the mirror so as to show an enlarged image of the numbers. In compasses designed to be used in this manner the figures on the card are reversed so that when looking at the reflection in the mirror they are seen in the usual way. For use at night the compasses of Service pilots are often illuminated by a small electric light placed inside the glass covering of the compass, where it lights up the card without dazzling the pilot. The necessary current is furnished by a small battery, which generally has a capacity of three or four hours.

After this brief description of the compass itself, the procedure of placing it in the aeroplane and adjusting it will be dealt with.

Placing the Compass.

Firstly it must be remembered that the north point of the compass does not point to the geographical North Pole, but serves to indicate the direction of the magnetic north or magnetic meridian. The difference between the "true" north and the magnetic north is known as the *variation*, i.e., the angle between the "true" and magnetic meridians at various points of the earth, and is called easterly or westerly variation according to whether the magnetic meridian is to the right or left of the "true" meridian.

It must also be remembered that the north point of a compass very seldom points to the magnetic north when placed in an aeroplane, in consequence of the usually large amount of magnetic material used in the construction of the machine, this said material attracting the compass needle one way or the other, and thus making it read incorrectly; this error is known as *deviation*. And therefore it is important that when laying out a course deviation and variation must be allowed for, unless deviation is eliminated by the means shown later under "Adjusting the Compass."

The position of the compass in the machine with reference to its surroundings is very important, and where possible the following points should be observed:—

I. The compass must be in a position where the pilot has an unobstructed view of the instrument.

II. If possible the compass should be placed on centre line, fore and aft, of the machine in order that the magnetic material surrounding the compass may be more or less symmetrical, and thus more easily compensated for when adjusting the instrument.

III. The pilot should be seated directly behind the compass so as to prevent errors in reading due to parallax. (The apparent angular shifting of an object caused by the change in position of the observer.)

IV. If possible the moving control levers, &c., in close proximity to the compass should be made of non-magnetic material; and it should be remembered that the ends of iron or steel rods are especially liable to have a disturbing effect on the instrument.

V. The compass should be placed as far as possible from the engine and magneto.

Adjusting the Compass.

Having placed the compass in the best available position, having in mind the points mentioned in the previous paragraph, if it is not possible to arrange the compass on the fore and aft line of the machine, but to one side of it, great care must be taken that the lubber line is exactly parallel to the fore and aft line of the machine.

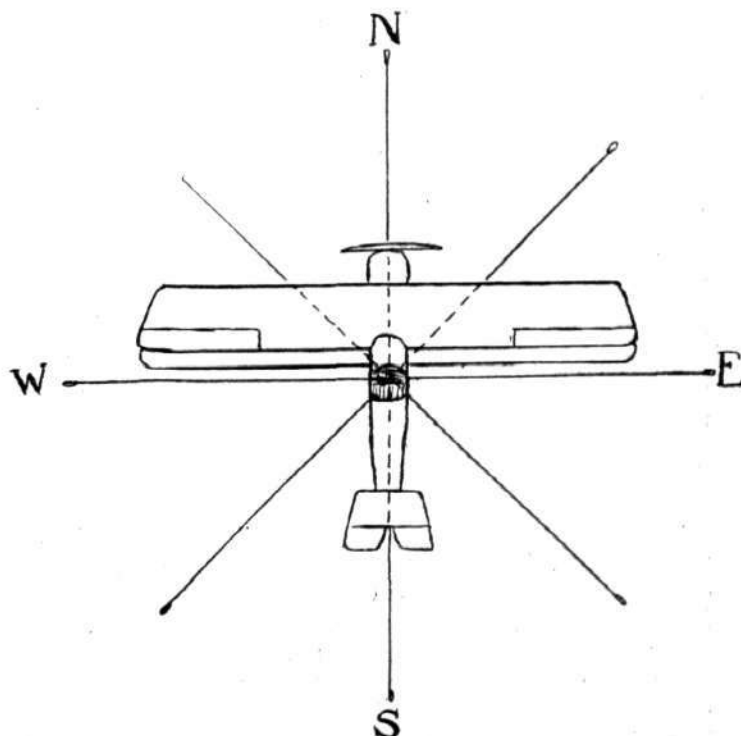
The object of compass adjustment is:—

1. To balance up the directive forces in whichever direction the machine is heading.

2. To reduce the deviation to the least possible values.

To adjust the compass proceed as follows:—

With the aid of another compass, lay out on the ground by means of pegs and cord the cardinal points N., S., E. and W., and the quadrantal points N.E., S.E., N.W., S.W., according to the direction indicated by the compass (not the compass in the machine).



Sketch showing method of laying out the compass points on the ground by means of cords and pegs. For testing the aero compass the machine is placed with its centre line parallel to the various cords.

This second compass may now be dispensed with, and the aeroplane compass corrected from the cardinal points now represented by cords on the ground.

A most important point to remember, however, when

laying out the compass points on the ground is, that a clear spot be chosen some considerable distance away from iron sheds, iron railings, or any such objects likely to disturb the compass. A wooden block for holding correcting magnets is supplied with all modern aeroplane compasses. This is a square block of wood with holes drilled in it from side to side and front to back, to contain the small magnets used for correcting the compass. This wooden block must be screwed exactly under the centre of the compass (use brass screws) with one set of the holes before mentioned running exactly fore and aft, and the other set exactly at right angles or athwartship.

The aeroplane should now be wheeled up to the testing ground, and placed heading north or south (magnetic), according to the cords on the ground; and the compass in the aeroplane allowed to steady. Should the N. or S. (as the case may be) point on the compass card come opposite the lubber line then the compass is correct on this point, but if not one or more of the little bar magnets must be inserted in the wooden block under the compass in an exactly athwartship or E. and W. direction, until the compass is pointing correctly. When this is the case the adjusting magnets must be secured in position by closing the little brass flaps which cover the holes in the wooden block.

Next turn the machine until it is heading E. or W. (magnetic) and go through the same process as mentioned above, except it must be remembered that the correcting magnets must this time be inserted in a *fore* and *aft* or north and south direction.

It is rarely possible to adjust a compass so accurately that there is absolutely no deviation left, so after adjusting the compass the machine should be "swung" and a note made of the remaining deviation on each cardinal and quadrantal point, and these notes tabulated and stuck in the machine for future reference. The deviation should be named E. or W. according to whether the compass is drawn left or right of the magnetic meridian.

Setting a Course.

As mentioned previously, a compass does not point "true" north but magnetic north, and the difference between the true and magnetic norths is known as variation. Thus it is a complicated matter to steer a magnetic course from a map which is based on the true meridian.

Variation varies at different points of the earth, and can be ascertained by consulting a variation chart. In order to steer a course without the necessity of correcting for variation mathematically it is possible to cancel it by the following generally adopted method:—

By altering the map in use to give a magnetic direction instead of a true one.

The following is the procedure of doing this:—

The map of the district over which it is intended to travel should be spread out flat on a table. In one corner of the map should be an arrow and a line cutting it at right angles, indicating the four cardinal points, the arrow head pointing true north; if it be the case that there is no such indication of the true north, then the ruled edges of the map from top to bottom run true north and south, true north being in the direction of the top of the map. For example, the variation in London is approximately 14° west. With the aid of a protractor and rule mark off an angle of 14° west, or to the left of the true north line of the map in use. And when setting a course always refer to the new line for magnetic north.

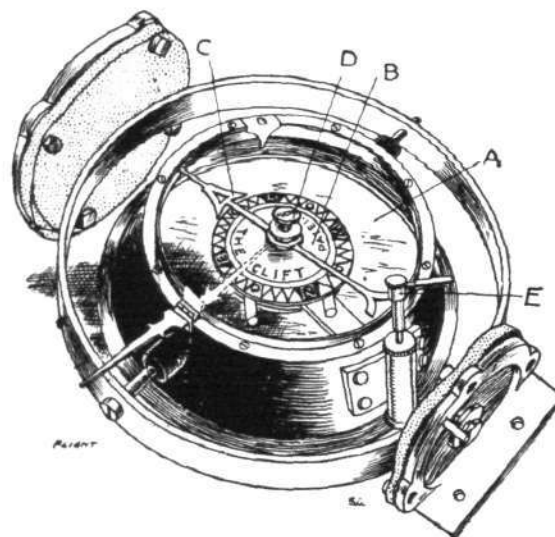
Draw a thin line from the starting point to the place it is desired to reach. Then place the centre of a protractor on the starting point (a circular protractor marked 0° to 360° is best for the purpose, and can be obtained

from dealers in artists' materials), being very careful to get the north and south line (the line joining 360° and 180° and passing through the centre) of the protractor parallel to the recently made magnetic meridian.

Where the circle of the protractor is cut by the line joining up the starting point and the objective point will be the desired magnetic course, and can be read off the compass card by getting the point of the required number of degrees under the lubber line.

The above-mentioned method of setting a course works quite well when there is no wind blowing, but as this is an ideal condition that is rarely if ever met with in practice, it becomes necessary to find means of maintaining a true course by ascertaining the direction and velocity of the cross-wind and its effect on the machine, or drift, as it is generally termed. It is, of course, well known that a cross-wind causes an aeroplane to fly an oblique course, the amount of drift depending on the ratio between the relative velocities of the wind and the machine and on the direction of the wind.

Compasses have been designed in which provision is made for ascertaining the drift, best known of which is perhaps that evolved a couple of years ago by Mr. Eric H. Clift. This compass, illustrated in the accompanying sketch, has a transparent container (A), a small compass card (B), and a course pointer (C), which, as its name indicates, once set to the required course will always



The Clift drift-indicating compass.

point in that direction. When starting out on a flight the pilot sets the pointer to the course he intends to follow. If, for example, this is due west, he arranges the pointer (C) to point directly on the west point of the card (B). This is accomplished by clamping the card (B) to the top of the container by screwing up the clamp (E). Then, by turning the central screw (D), which engages by means of dowel pins in the pointer (C), when the card is clamped up and held stationary, the pointer may be moved to indicate the required course. The clamp screw is then released, the compass card swings free, and the pointer will indicate, following out our example, due west. If a side wind is blowing, and a course steered by keeping the pointer on the lubber mark, it will be observed that objects on the ground seen through the transparent container will traverse paths at an angle to the course pointer. This is due to the drift, and in order to eliminate it the direction of the aeroplane must be altered so that, looking through the compass, terrestrial objects will follow paths parallel to the pointer.

The Royal Aero Club of the United Kingdom

OFFICIAL NOTICES TO MEMBERS

Aviators' Certificates.

THE following Aviators' Certificates have been granted:—

- 1486 2nd Lieut. Herbert Babington Robin Rowell, R.E. (T.F.) (Maurice Farman Biplane, Military School, South Farnborough). July 29th, 1915.
- 1487 Flight Sub-Lieut. Richard Sebastian Willoughby Dickinson, R.N.A.S. (Maurice Farman Biplane, Royal Naval Air Station, Chingford). July 29th, 1915.
- 1488 George Irwing (L. and P. Biplane, London and Provincial School, Hendon). July 30th, 1915.
- 1489 Flight Sub-Lieut. Charles Adrian Maitland Heriot, R.N.A.S. (Maurice Farman Biplane, Royal Naval Air Station, Eastbourne). July 31st, 1915.
- 1490 Lieut. Kenneth Mathewson (Caudron Biplane, Ruffy-Baumann School, Hendon). July 31st, 1915.
- 1491 Lieut. Charles Merideth Bouvine Chapman (The Buffs) (L. and P. Biplane, London and Provincial School, Hendon). July 31st, 1915.
- 1492 2nd Lieut. Arthur Henry William Tollemache, R.E., (Maurice Farman Biplane, Military School, Shoreham). Aug. 1st, 1915.
- 1493 Charles Maud Jacques (Belgian Subject) (L. and P. Biplane, London and Provincial School, Hendon). Aug. 1st, 1915.
- 1494 2nd Lieut. Robert Parbury Romer (Royal Dublin Fusiliers) (Maurice Farman Biplane, Military School, Ruislip). Aug. 2nd, 1915.
- 1495 Capt. John Upton Kelly (Wiltshire Regt.) (Maurice Farman Biplane, Military School, Shoreham). Aug. 4th, 1915.
- 1496 Flight Sub-Lieut. Lewis Morgan, R.N.A.S. (Maurice Farman Biplane, Royal Naval Air Station, Chingford). Aug. 5th, 1915.
- 1497 2nd Lieut. Charles Walter Palmer (Leicestershire Regt.) (Maurice Farman Biplane, Military School, Farnborough). July 24th, 1915.
- 1498 Capt. George Ronald Ellis (Maurice Farman Biplane, Military School, Shoreham). July 25th, 1915.
- 1499 Flight Sub-Lieut. Marmaduke Alfred Osborn, R.N.A.S. (Maurice Farman Biplane, Central Flying School, Upavon). July 29th, 1915.
- 1500 Flight Sub-Lieut. Charles Hamilton Murray Chapman, R.N.A.S. (Maurice Farman Biplane, Royal Naval Air Station, Eastbourne). July 31st, 1915.
- 1501 Flight Sub-Lieut. Edward Albert Pearson, R.N.A.S. (Grahame-White Biplane, Grahame-White School, Hendon). July 31st, 1915.
- 1502 2nd Lieut. Sidney Ernest Parker (York and Lancaster Regt.), (Maurice Farman Biplane, Military School, Farnborough). Aug. 1st, 1915.
- 1503 Allister M. Miller (Maurice Farman Biplane, Military School, Birmingham). Aug. 4th, 1915.
- 1504 Cyril Hubert Ralli Johnston (Maurice Farman Biplane, Military School, Ruislip). Aug. 4th, 1915.
- 1505 2nd Lieut. Arthur Tyrconnel Wynyard-Wright (East Surrey Regt.), (Maurice Farman Biplane, Military School, Birmingham). Aug. 4th, 1915.
- 1506 Arnold Charig (Maurice Farman Biplane, Military School, Brooklands). Aug. 5th, 1915.
- 1507 James Stuart Castle (Maurice Farman Biplane, Military School, Brooklands). Aug. 5th, 1915.
- 1508 Leonard Franklyn Hursthouse (Maurice Farman Biplane, Military School, Brooklands). Aug. 5th, 1915.
- 1509 William Percy Cort (Maurice Farman Biplane, Military School, Brooklands). Aug. 5th, 1915.
- 1510 Arni Baumann (Caudron Biplane, Ruffy-Baumann School, Hendon). Aug. 5th, 1915.
- 1511 Flight Sub-Lieut. Russell Douglas, R.N.A.S. (Grahame-White Biplane, Grahame-White School, Hendon). Aug. 5th, 1915.
- 1512 Flight Sub-Lieut. Roderic Stanley Dallas, R.N.A.S. (Grahame-White Biplane, Grahame-White School, Hendon). Aug. 5th, 1915.
- 1513 John Robert Allan (Maurice Farman Biplane, British Flying School, Le Crotoy, France). Aug. 6th, 1915.
- 1514 2nd Lieut. Allan Higson Smith (Lincolnshire Regt.) (Maurice Farman Biplane, Military School, Birmingham). Aug. 6th, 1915.
- 1515 2nd Lieut. Geoffrey Chance (Royal Fusiliers) (Maurice Farman Biplane, Military School, Birmingham). Aug. 6th, 1915.
- 1516 2nd Lieut. Cyril Bertram Cooke, R.G.A. (Maurice Farman Biplane, Military School, Birmingham). Aug. 6th, 1915.
- 1517 Francis William Richard Banks (Caudron Biplane, Beatty School, Hendon). Aug. 7th, 1915.

THE FLYING SERVICES FUND administered by THE ROYAL AERO CLUB.

THE Flying Services Fund has been instituted by the Royal Aero Club for the benefit of officers and men of the Royal Naval Air Service and the Royal Flying Corps who are incapacitated on active service, and for the widows and dependants of those who are killed.

The Fund is intended for the benefit of all ranks, but especially for petty officers, non-commissioned officers and men.

Forms of application for assistance can be obtained from the Royal Aero Club, 166, Piccadilly, London, W.

Subscriptions.	£	s.	d.
Total subscriptions received to August 4th, 1915	9,448	10	5
Employés of the Blackburn Aeroplane and Motor Co., Ltd. (Fifth Subscription)...	0	14	4
Miss E. Ockenden...	1	0	0
Employés of Ruston, Proctor, and Co., Ltd. (Second Subscription) ...	1	0	0

Total, August 11th, 1915 ... 9,451 4 9
166, Piccadilly, W. B. STEVENSON, Assistant Secretary.

FROM THE BRITISH FLYING GROUNDS.

London Aerodrome, Collindale Avenue, Hendon.

Grahame-White School.—Last week with instructor on machine: Probationary Flight Sub-Lieuts. Beare, Gasson, Roach-Pierson, Smethurst, Corry, and Ford. Circuits and eights with instructor: Probationary Flight Sub-Lieuts. Blake, Douglas, Barrington, Murray and Sieveking. Circuits and eights alone: Probationary Flight Sub-Lieuts. Blake, Perham, Barrington, and Dallas. Certificates during week: Probationary Flight Sub-Lieuts. Barrington and Douglas. Very good tickets. Probationary Flight Sub-Lieut. Dallas. Excellent. Instructors: Messrs. Manton, Russell, and Winter.

Beatty School.—The following pupils were out during last week: On Beatty-Wright machines, accompanied by

the instructors: Messrs. Arbon (35 mins.), Banks (25), Delves (35), Dickenson (30), Eaton (15), FitzHerbert (24), Fox (10), T. Jones (29), King (39), Morgan (25), Onley (20), Ross (26), Sampson (30), Theo (16), Tomlinson (40), Vickers (15), Wiles (18). On Caudron machine: Messrs. Alcock (15 mins.), Arter (15), Boysen (15), Broadbent (5), Cadogan (15), Coates (10), Collett (10), Cox (20), Davison (5), Fawcett (10), Fellowes (5), Goodfellow (10), Greenhill (5), L. F. Jones (5), Kirkwood (15), Middleton (5), Moxon (5), Nash (15), Nicholson (5), Owen (15), Smith (5), Spicer (10), Thompson (5), Tolhurst (10), Campbell (10), Thomas (20). Extra practice was taken by Messrs. Kenworthy, King and Everidge.

On Saturday morning Mr. F. W. R. Banks flew for his certificate.

Exhibition flights were given on Monday (Bank Holiday), and on Thursday, Saturday and Sunday, and three passenger flights were taken.

Hall School.—Again last week the Hall School had an excellent week's practice in spite of adverse weather conditions. The following pupils passed for their pilot's certificates: Messrs. Booker, Snowdon, Lieut. Phillpotts, and Mr. A. E. Gay. All these pupils have qualified at the Hall School without the breakage of a single wire or mishap of any description to the machines (Hall tractor biplanes). Most of the other pupils are also making exceptional progress. Pupils receiving instruction with Mr. Stevens were: Messrs. Gay (3 circuits and 6 figures of 8), Lieut. Phillpotts (4 circuits and 1 figure of eight), Mr. Booker (1 figure of eight), Snowdon (1 figure of eight), Gordon (6 circuits and 2 figures of eight). Pupils receiving tuition with C. M. Hill were: Messrs. Hatchman (28 mins.), Mason (10), Hamer (10), Lieut. Jowett (30), Russell (14), Yonge (28), Gordon (32), Punnett (4), Bangs (24), Bell (46), Wilkins (14), Huggan (8), Watson (26), Wenner (4), Goodrich (32), Arnsby (16), Drew (32), Hooker (18), Littlewood (30), and Butterworth (8). All doing straights and half circuits. Machines in use, Hall tractor biplanes.

London and Provincial Aviation Co.—Pupils doing rolling last week: Messrs. Frost, May, Maze, Woodley and Roe. Straights: Messrs. Sykes, Moynihan, Welsford and Wynne-Eyton. Circuits: Messrs. Welsford and

Jacques. Instructors: Messrs. M. G. Smiles, W. T. Warren and James.

On Saturday evening last Lieut. C. Chapman passed for his certificate after only eleven days' tuition, and on August 1st M. Jacques obtained his *brevet* in fine form.

Ruffy-Baumann School.—Many pupils have been out on the 60 and 50 h.p. 'buses last week, and the following have made the most of their opportunities:—Belton, Young, Bailey, Ball, Liddell, Hughes, Prothero, Stewart, Muspratt, Railton, Gardner, May, Wilson, Hodgson, and Wallis. Instructors: Edouard Baumann, Felix Ruffy, Gino Virgilio, and Clarence Winchester.

M. Ami Baumann, who is cousin to Edouard Baumann, the well-known chief pilot of this school, passed for his ticket in good style, as also did Messrs. Fitzsimons and Railton, whose performances were above reproach.

Northern Aircraft Co., Ltd.

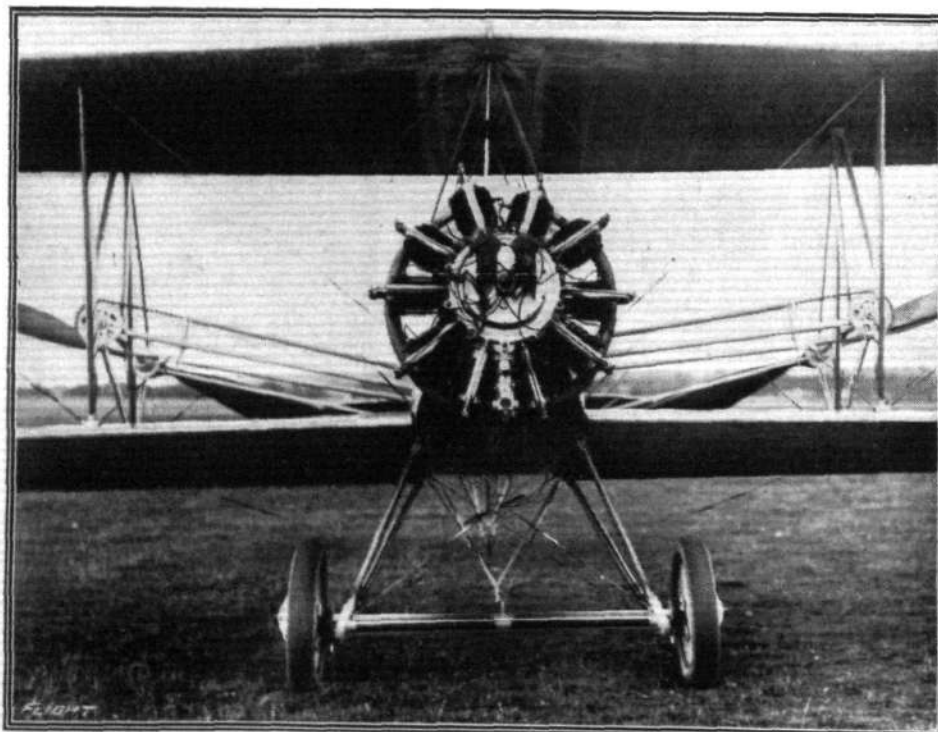
The Seaplane School, Windermere.—Last week pupils out with instructor: Buck (20 mins.), Inglis (26), Latch (22), Lawton (19). Instructor in passenger seat: Macaskie (31 mins.), Part (12), Robertson (22), Yates (20). Certificate taken: Mr. R. Buck. Machines in use: N.A.C. 50 Gnome propeller biplane and N.A.C. 80 Gnome monoplane (pusher). Instructors, W. Rowland Ding and J. Lankester Parker.

Mr. Rowland Ding out on monoplane and biplane making tests and giving exhibition flights. J. Lankester Parker doing the same on biplane.

FLYING AT HENDON.

ON Wednesday and Thursday of last week the 125 h.p. Mann twin pusher biplane was introduced to a new pilot, when Sydney Pickles—who, once more attired in civilian raiment, has lost no time in getting to work at the all-important matter of testing new machines—brought out further good points in this interesting craft. After a preliminary straight on the Wednesday evening, he climbed up to about 3,000 ft., taking ten minutes for

that elevation. The next evening, with Mr. R. F. Mann in the passenger's seat, he made a flight lasting 1 hour 5 mins., getting up to an altitude of 5,000 ft. in the first 20 mins. The 'bus climbed with great steadiness and seemed capable of double the height, but darkness and rain said "No." The speed, with passenger, was 75 m.p.h., and the climbing speed was only a little below 70 m.p.h. This, it must be admitted, is rather exceptional, and a



Centre part of the Mann biplane showing the 125 h.p. Anzani engine, as seen from the front.

very important factor where "Zeppstraffing" is considered. Pickles said he was very satisfied with the manner in which the machine behaved, and that it was certainly quite a nice 'bus to handle in the air. On each of these occasions "Mann" propellers were fitted, and considerable improvement had been accomplished in the petrol system. At present an examination is being made of the gear-box, but in all probability further trials will be made this week-end.

Last Saturday was decidedly unpleasant, both up above and down below. A fine rain was falling early in the afternoon, and the wind, though moderately low, was bumpy. At 3.30 p.m. M. Osipenko could stand it no longer, so he took the G.-W. school 'bus by the joy-stick and went up to see if he could clear the air a bit. Apparently he was successful, for it brightened up somewhat immediately after. C. B. Prodger came out next on the 40 h.p. Beatty-Wright, and then J. S. B. Winter and Marcus D. Manton, on the 50 h.p. G.-W. school 'bus, got busy for the rest of the afternoon. E. Baumann ascended on high on the 60 h.p. Ruffy-Baumann biplane, and R. Kenworthy put up some practice on the 45 h.p. Beatty-Caudron. Later on two very fine passenger

flights were made by M. G. Smiles on Mr. Abbott's 45 h.p. L. and P. biplane, and W. Roche-Kelly, on the 50 h.p. Beatty-Wright, completed the list of pilots out.

On Sunday the rain, for once in a way, kept clear of Hendon, and a good afternoon's flying resulted. As usual, M. Osipenko topped the list, for he appeared to spend more time in the air than on the ground, and by changing over from time to time from the 50 h.p. G.-W. school 'bus to the 100 h.p. five-seater he managed to avoid the monotony of it all. Marcus D. Manton and J. S. B. Winter were also "going it strong" on the school 'buses, whilst Beatty's bankers, C. B. Prodger, and W. Roche-Kelly, did their show on the 60 h.p. and 50 h.p. Beatty-Wrights. M. G. Smiles made another high flight on the 45 h.p. L. and P. biplane, and G. Virgilio stunted around on the 50 h.p. Ruffy-Baumann biplane. Perhaps one of the most interesting events of the afternoon was the appearance of Harry Hawker on the single-seater Beatty-Wright. He showed that flying fast Sopwith scouts in no way affected his old masterly handling of this type of machine, for it was, it will be remembered, on the Sopwith-Wright he made his name.

✱ ✱ ✱ ✱ FLYING AT LEEDS.

SPECIAL flying exhibitions were given by W. Roche-Kelly (by arrangement with the Grahame-White Aviation Co., Ltd.), at Roundhay Park, Leeds, last Bank holiday and the Tuesday following in connection with the 29th Annual Gala of the Leeds Workpeople's Hospital Fund. Roche-Kelly was flying the 50 h.p. single-seater Beatty-Wright biplane, and although on both days the weather was very stormy and the "aerodrome" was of the "tabloid" variety, the exhibitions went off remarkably well. Two exhibitions were given, at 3.30 p.m. and 7 p.m. each day, and on each occasion Roche-Kelly treated the spectators to several of those thrilling banks of his so well

known to Hendon visitors. Incidentally his first steep bank disclosed, rather suddenly, that when the machine was at an angle of 90° or thereabouts, the petrol flatly refused to disobey Sir Isaac Newton's law, with the result that the engine suffered from a shortage of "Shells"—or was it Pratts? However, a nose dive brought the machine to its senses again, and also caused the spectators' hearts to climb at a rate of "some" feet per minute. This little defect was temporarily remedied at the conclusion of the flight. There were 65,000 people present on the Bank Holiday, witnessing the sports and flying, and an equally good gate the next day.

The Roll of Honour.

THE Secretary of the Admiralty has announced the following casualty:—

**Reported Missing August 3rd, now presumed to have
Lost his Life.**

Flight-Lieutenant Kenneth F. Watson, R.N.

Killed on Landing in the Dark during Air Raid (Aug. 9-10th).

Flight Sub-Lieutenant R. Lord, R.N.

**Slightly Injured while Landing in the Dark during Air
Raid (Aug. 9-10th).**

Flight Sub-Lieutenant George H. Jackson, R.N.

The following casualties reported from General Headquarters have been officially announced by the War Office:—

Under date July 30th:

Wounded.

Second Lieutenant C. S. L. Whidborne, 14th Hussars, attached R.F.C.

Under date August 1st:

Wounded.

Second Lieutenant D. K. Johnstone, Royal Flying Corps.

Captain J. A. Liddell, Argyll and Sutherland Highlanders and R.F.C.

Lieutenant J. G. Selby, Royal Field Artillery and R.F.C.

Missing.

Lieutenant P. A. Broder, 5th Worcestershire Regt. and R.F.C.

Second Lieutenant R. C. Macpherson, Black Watch and R.F.C.

Under date August 2nd:

Died of Wounds.

Lieutenant R. T. Vachell, 1st Northumberland Fusiliers and R.F.C.

Missing.

Second Lieutenant W. Reid, 6th King's (Liverpool Regt.) (T.F.) and R.F.C.

Officially reported Missing and Unofficially reported Interned in Holland.

Captain R. E. B. Hunt, Shropshire Light Infantry, attached R.F.C.
Lieutenant F. H. Jackson, Royal Sussex Regt., attached R.F.C.

Under date August 4th:

Wounded.

Lieutenant G. Allen, Connaught Rangers, attached R.F.C.

Undated:

Officially reported Missing, and Unofficially reported Died of Wounds.

Second Lieutenant J. Parker, King's Own (Royal Lancashire Regt.), attached R.F.C.

More D.C.Ms. Won by Royal Flying Corps.

IN the list of awards of the Distinguished Conduct Medal published in the supplement to the LONDON GAZETTE issued on the 5th inst. there were the following:—

1031 Corporal J. N. Rogers, R.F.C.

For conspicuous gallantry on May 10th, 1915, when he was acting as gunner with an officer pilot in the neighbourhood of Lille. A German aeroplane, armed with a machine gun, was attacked at a height of about 10,000 ft.; the hostile pilot was hit, and his aeroplane dived, but was followed, and the flight continued until at an altitude of about 1,500 ft. it turned on its back and fell to the ground.

2726 2nd Class Air-Mechanic H. W. Sutcliffe, R.F.C.

For great gallantry and zeal while employed as a gunner with an officer pilot. On May 9th, 1915, over Wytchaete, they engaged a German aeroplane at a height of about 4,000 ft. After a sharp fight, the hostile machine turned on its side, and finally fell to the ground nose first, and was wrecked.

SOME INTERESTING AMERICAN POWER PLANTS.

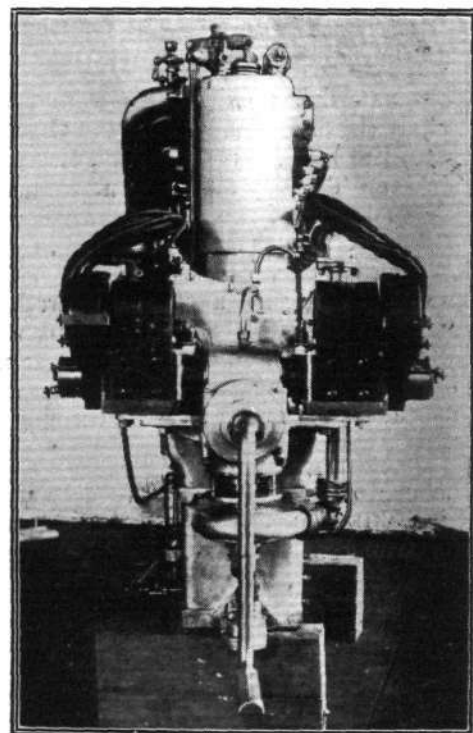
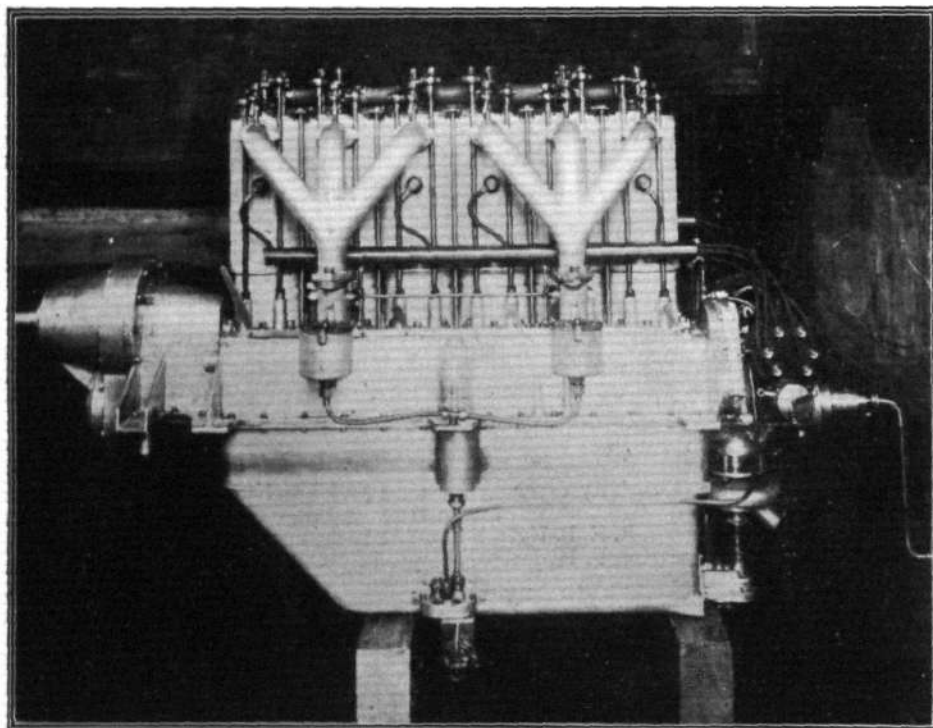
THE AEROMARINE AVIATION MOTORS.

OF the American motor manufacturers who have facilities of sufficient capacity to turn out aeroplane engines at a rate commensurate with the existing demand, one which has not up to the present been very well known in this country, but of which more is likely to be heard in the future, is the Aeromarine Plane and Motor Co., of Nutley, N.Y. This firm, which claims to have had considerable experience in the production of petrol motors, and various parts for same, are now marketing three types of engines suitable for aircraft. One of these is a six-cylinder vertical engine of 85-90 h.p., whilst the second is a similar engine with a bore of $4\frac{5}{16}$ in. and a stroke of $5\frac{1}{8}$ in., rated at 100 h.p. These two engines are practically identical, with the exception that the last mentioned is fitted with a 4 to 7 reduction gearing for the propeller shaft. A third type of engine turned out by this firm is a 12-cylinder V-type, rated at 165 h.p.

The 100 h.p. engine shown in accompanying illustrations is, as has been already pointed out, of the vertical

The crankshaft is also machined from a solid forged billet, heated and ground, and is of special nickel steel, main bearings being provided on both sides of each crank throw. The main bearing caps are each provided with four retaining bolts, of which the two innermost of each cap pass through the crank case and are fitted with retaining nuts at the top of the cylinder base. In this connection it may be pointed out that the method of tying down the cylinders is by tie-rods extending upward to light bridge pieces resting on and across the top of the cylinder heads, so that the two in conjunction take care of the internal stresses, initial pressures of explosions, &c. All the bearings throughout the motor other than ball bearings, are of die-cast Fahrig metal, and are interchangeable.

The connecting rods, which are of I-section, are machined from solid hand-forgings of Carpenter special nickel steel, giving a strong and at the same time very light construction. The merit claimed for this is not



THE 100 H.P. AEROMARINE ENGINE.—On left the inlet side, and on right end view.

type, and has six cylinders of *Vanadiumlight*, machined inside and out. The water jackets are of copper, and are electrically deposited to a thickness which has been found substantial and resilient.

One of the special features of this engine is the use of an overhead concentric valve, that is to say, the exhaust valve is in the centre of the cylinder head, and contains the inlet valve in its centre. In this way it is possible to obtain a very large valve area, a most important point in a high speed engine. The valves are operated by a camshaft placed in the crank case, through a push rod and rocker for each valve. The hollow camshaft, which is made of high grade steel, heat treated and ground, is provided with seven split bronze bush bearings, the bearing surfaces being babbitted. All the cams, which are, of course, integral with the camshaft, are hardened and ground.

only exact uniformity of weight, which is in itself a highly important item in high-speed engines, but also it gives a connecting rod of such light weight that stresses are reduced to a minimum.

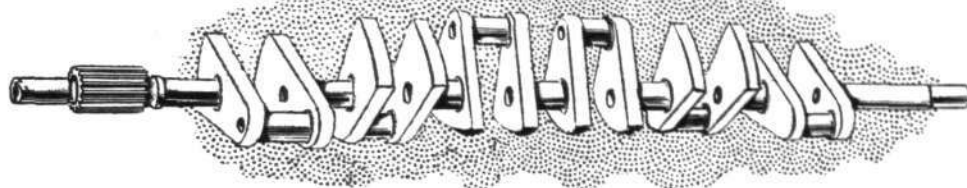
Ball bearings are fitted on each side of the driving gear by means of which the propeller shaft is driven at a ratio of 1 to 1.75 of the motor. At the other end of the crankshaft ball bearings are also provided to carry the load of driving the camshaft, water and oil pumps, and magnetos.

The lubrication system is of the forced-feed type, the oil being contained in a reservoir having a capacity of five gallons. When the motor is running, the gear-driven Duplex high-and-low pressure oil pump takes oil from the reservoir, and delivers it through ways machined in the walls of the crank case, &c., to the crankshaft bearings. A hole is drilled in the wall of the crankshaft in line with

the bearing, and through this the oil runs into the hollow crankshaft, and from there to the connecting rod bearings, and to the driving gears mounted on the crankshaft. The oil is also forced in a similar way to and through the hollow camshaft, which is cross-drilled in a running line with the connecting rods, enabling a

gudgeon pins, the pistons forming the bearings for the gudgeon pins.

The connecting rods, which are built up of two pieces welded together, are of pressed steel of a somewhat peculiar section, being a combination of I-section and oval section. There are four very large main bearings



Sketch showing crankshaft of the 165 h.p. Aeromarine engine.

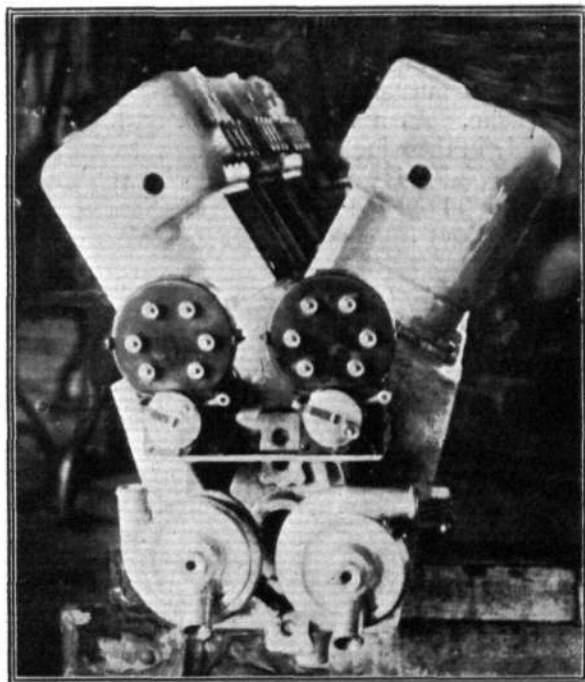
stream of oil to pour on to the rods while running. Oil is also directed from the camshaft to the camshaft bearings, cam followers, and guides, &c. The pistons and cylinder walls are splash lubricated, and all the surplus oil is thrown by the rapidly revolving parts to the sides and bottom of the under half of the crankcase, from where it drains down through a hollow extension of the under half of the crankcase. This extension leads down and through the oil in the reservoir to the low pressure gear train of the Duplex oil pump, from which it is returned to the reservoir and cooled. In order to ensure the return of the oil for any position of the machine, gravity is not relied upon to accomplish this, but the oil is drawn by the pump from the sump, so that even when the machine is flying upside down, the oil is drained out of the sump.

In order to further ensure the reliability of the engine, everything is in duplicate, including two magnetos and two sparking plugs in each cylinder, and two Zenith carburettors, each feeding three cylinders through a three-way manifold induction pipe. Needless to say, the two carburettors are synchronised, having their throttles connected and working together.

Although differing in type from the engine described, the 12-cylinder V motor has several points in common with the vertical engine, especially as regards the lubrication system. The twelve cylinders, which have a bore of $4\frac{1}{2}$ ins. by a stroke of 6 ins., are placed in two rows 60 degs. apart. They are made of a special alloy called Vanadiumlight, and into these a hardened and ground steel sleeve is pressed. In this engine the water-jackets are cast, and not of copper, as they are in the vertical motor, while the cylinders are held down by studs through the crankcase. The valves are of the ordinary poppet type, with cone seats, and the material used for them is Tungsten.

The hollow camshaft, on which the cams are machined for all twelve cylinders, is placed in the angle between the cylinders. The crankshaft, which is shown in the accompanying sketch, is hollow, and has been very carefully balanced by means of balance weights in the manner shown in the sketch. The pistons, which are of the same metal as the cylinders, are fitted with three lap-jointed rings, and the connecting rods are pinned to the

with bronze casings and lined with Fahrig white metal, which is also used in the big ends of the connecting rods. Little need be said regarding the lubrication system, which is practically identical with that of the vertical engine. From the Duplex high-and-low pressure oil pump the oil runs to an external separator fitted with an adjustable screw by means of which the pressure may be regulated to the desired amount. Hence oil is forced through a pipe running longitudinally through the crankcase and having branch pipes leading to the main bearings. Two carburettors and two magnetos are fitted,



End view of the 165 h.p. Aeromarine engine.

and water circulation is by means of two centrifugal pumps. At full power the crankshaft speed is 2,000 r.p.m., giving through gearing a propeller-shaft speed of 1,200 r.p.m. The weight works out at less than 4 lbs. per h.p., not, of course, including radiators and cooling water.



A Tribute to Lieutenant Warneford.

As a tribute to the gallant work of the late Lieut. Warneford in destroying a Zeppelin near Ghent, the workers in the Morane, Gnome and Le Rhone factories raised a fund to present him with a replica in jewels of the Cross of the Legion of Honour conferred on him by the French Government. Unhappily his death came before this could be done, but the cross has been presented to his mother, Mrs. Corkery.



Promotion for Paulhan.

ACCORDING to information received by the PETIT PARISIEN from Serbia, Lieut. Louis Paulhan, who with Martinet was lent by France to Serbia some time ago to organise a flying school, has been promoted captain for having, after a dramatic pursuit, brought down an Austrian aeroplane and having dropped bombs on the enemy's hangars at night, causing the explosion of a large petrol dépôt.

EDDIES.

OFFICIALS whose duty it is to act as observers on behalf of the Royal Aero Club when pupils are going through their *brevet* tests must get pretty hardened to all sorts of happenings, and are not easily surprised at anything a pupil may, inadvertently or otherwise, do while getting his "ticket." However, for once the gentlemen who were observing the *brevet* flights of Lieut. J. R. Phillpotts of the Hall Flying School the other day, which flights, by the way, were very excellent ones I am told, did receive a little surprise packet in the shape of dummy bombs dropped on them by Lieut. Phillpotts every time he passed overhead in his figure of eight tests. Knowing the pupil in question, whose favourite hobby in between flights is buck-jumping over obstacles on his motor-bicycle, it was generally expected that he would relieve the monotony of the *brevet* flights by some means or other. And this was his method. Perhaps as time is an element just now, and as he will likely enough be joining up with one of the flying services, the idea of his to get his hand in from the very beginning in this way was pardonable. It's bombing time now, with a vengeance.

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A propos school pupils, it is gratifying to see how anxiously they await the afternoon, when the wind generally drops sufficiently for school work to be carried on. At almost any school during the middle of the day one constantly notices keen pupils walking up to the ever-present instructor, who is frequently glad enough to take a couple of hours' rest between morning and afternoon practice, and asking him, in as casual a way as may be possible to muster, if he does not think that it is perfectly calm. As a rule, instructor and pupil differ considerably in their judgment of wind velocity, and the variance in opinion is generally settled by the instructor taking the pupil outside the shed and showing him the flag streaming out from its pole at a smaller or greater

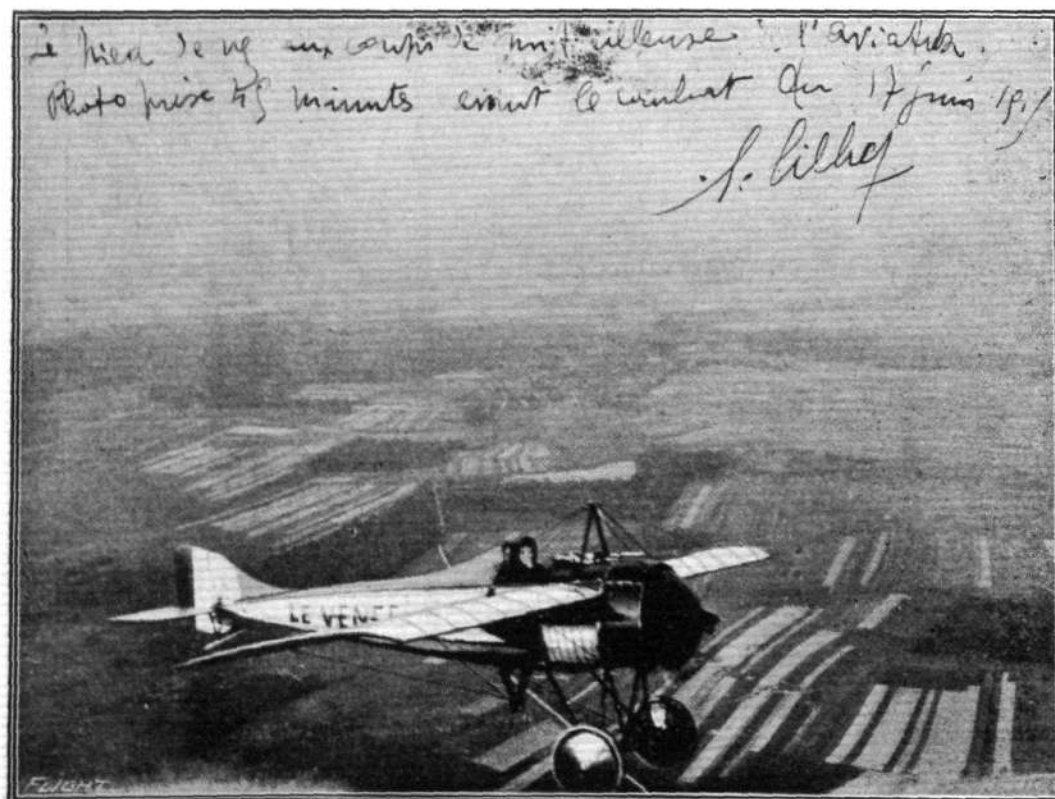
angle. While visiting one of the schools the other day, I noticed a very clever dodge on the part of some pupil. The flag of this particular school had been tacked down along the pole so as to give the appearance of a perfect calmness. Unfortunately for the pupil, or perhaps one should say fortunately, the instructor did not rely upon his own flag only, but had a look at the row of flags on the other sheds, and as these were flapping lustily in the breeze, the disappointed pupil had to wait until the wind really did drop.

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After such a series of brilliant feats in the service of La Patrie, it does seem hard luck for two of France's best-known pilots, the two Gs. one might call them, Garros and Gilbert, to have been put out of the running for the rest of the war by one and the same cause, one which is the constant dread of every pilot — engine trouble. While Garros, as is of course well known, is a German prisoner of war, Gilbert's engine took it into its head to strike while over Swiss territory, with the result that he is now interned in that country. It is really rather difficult to say which of the two alternatives is preferable, for while Garros, should the opportunity present itself, can without any scruples take his chances and attempt to escape, Gilbert, being interned in a neutral country, will probably have given his word of honour not to try to escape. In the accompanying remarkable photograph, which we reproduce by courtesy of our French contemporary, L'AEROPHILE, taken from another Avion, Gilbert is seen in his peculiar streamline Morane-Saulnier monoplane, *le Vengeur*, flying at a good altitude a few minutes previous to a victorious fight with a German Aviatik.

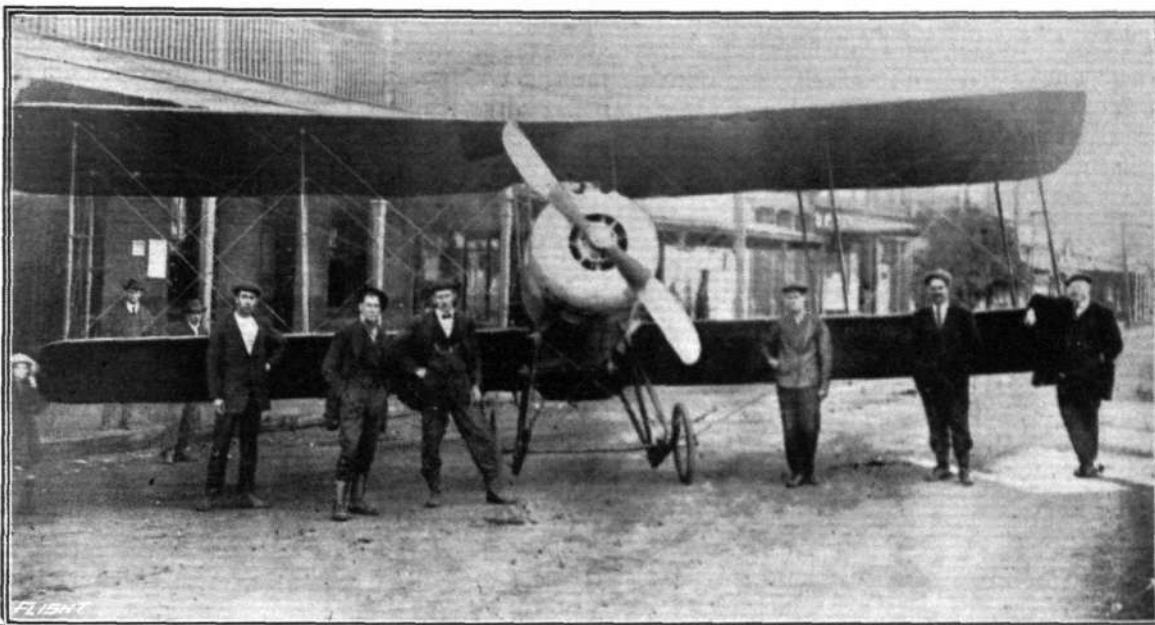
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Some time ago, it may be remembered, mention was made in "Eddies" of a new tractor biplane with a 50



A curious photograph showing M. Gilbert, the well-known French aviator, on his Morane-Saulnier "le Vengeur," taken from another French warplane, on June 17th last, 45 minutes before Gilbert made his attack against one of the enemy's Aviatik machines. Photograph reproduced by courtesy of *l'Aerophile*.

The Kalgoorlie Aero Syndicate's biplane after landing in Bayley Street, Coolgardie.

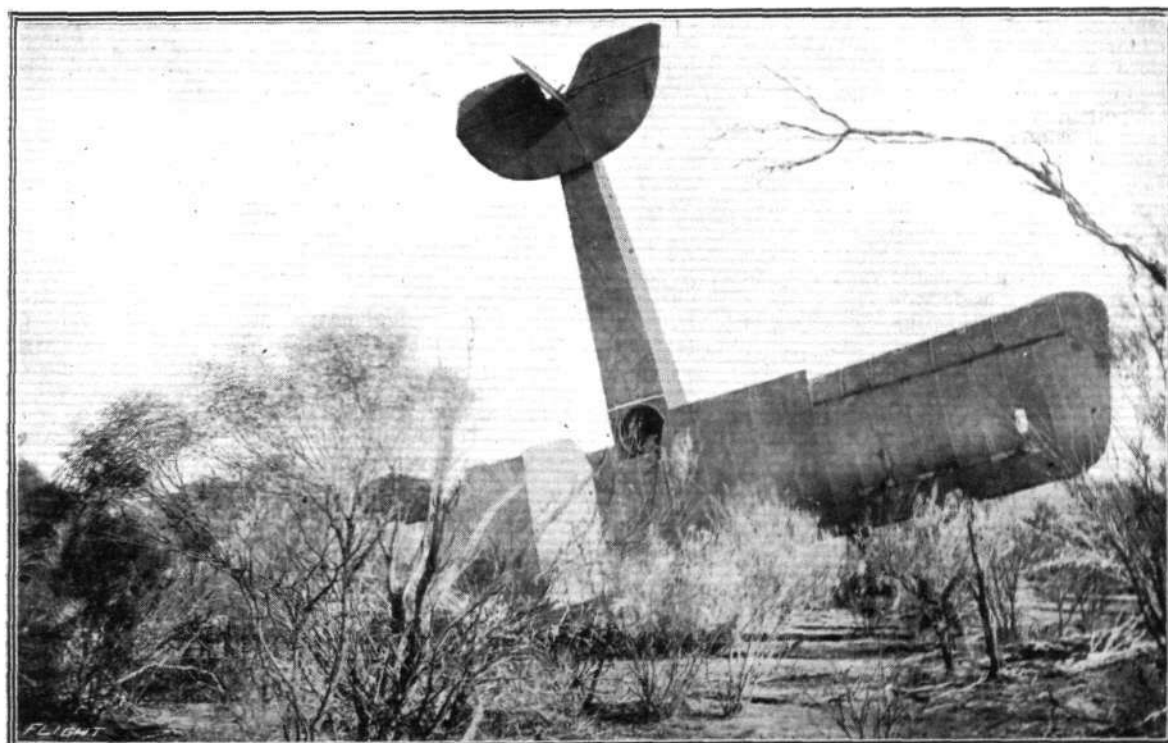


horse-power Gnome engine built by a small syndicate out in Kalgoorlie, Australia, and which was, as stated at the time, badly damaged through the horses that were hauling it away on a lorry taking fright and bolting, as horses have a happy knack of doing at awkward moments. The Kalgoorlie Aero Syndicate, which is responsible for this aircraft, comprises ten working members, the majority of whom are artisans, and the whole of the machine, with the exception of the wire strainers, was built by themselves. It is expected that it will take a couple of months to put the machine in flying trim again, as most of the work is being done during spare hours. In spite of various handicaps, all the members are setting to work with a will, and are naturally enough looking forward to the time when their firstborn will again be ready to take the air. This is the sort of spirit which deserves and will without doubt be rewarded by ultimate success. One of the two accompanying photographs shows the machine where

it had landed in Bayley Street, Coolgardie, after its first flight, and in the other it is seen standing on its nose after landing in the bush owing to engine trouble.

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In chatting to various pilots who have been out to the Front one naturally hears of a good many extraordinary incidents, but one of the most remarkable experiences that have come to my notice so far was told me the other day by a pilot who has repeatedly been under the fire of the enemy. Returning from a reconnaissance flight, shells were bursting all round him, and once, looking back over his shoulder just as one exploded a little way behind the machine, he saw a fairly large piece which he judged to be the cone-shaped nose of the shell approaching in a series of small loops and overtaking him at the rate of four or five miles an hour. So fascinated was he that it was not until this fragment of shell was within photographing distance that he thought of getting out of its



The Kalgoorlie Aero Syndicate's biplane on its nose in the bush after its forced landing through engine trouble.

way, which he did by steering a sharp left-hand turn. As a matter of fact, the probability is that by the time the piece had reached him it would have been so far spent as to have caused little or no damage had it really hit the machine. But, after all, there is nothing clever in taking unnecessary chances.

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Another pilot told me of how one day he was flying over the enemy's lines, with shells exploding to the left and right, when one went pop, as it seemed to him, right in the angle between the wings and fuselage. So great was the force of the explosion that, although it must in reality have taken place at a considerable distance, it rendered the pilot temporarily deaf. At first he thought his engine had stopped, as never a sound reached him therefrom, but, seeing his propeller continuing to revolve,

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AIRCRAFT IN THE WAR AND GERMAN ADAPTABILITY.

THE following very informative article by Mr. F. Prevost Battersby in the MORNING POST, written from the British Headquarters under date of August 8th, gives an excellent idea of the part being played by aircraft in the war and the way in which the German aviation service has rapidly adapted itself to new conditions:—

"Beyond question the most significant happening of the past month has been in the air. One might almost call it the reappearance of the German airmen, only that would convey the impression of an absence more complete than has been the case. The German airman has always been here, but—under conditions.

"A despatch of the Commander-in-Chief has made all Englishmen aware of the ascendancy which our airmen established over the enemy from quite the early days of the war, so that it was possible to state that during the two previous months, in no single instance, where plane had been pitted against plane, could a German success be recorded, even when the odds were considerably in the enemy's favour.

"Our planes had been brought down by shell-fire, by engine trouble, by accident, but never once by the superiority of the enemy's airmen, while, time after time, we had chased them back to their lines, or beaten them out of the air, till the German fliers were forced ever higher and higher for safety, and it became the accepted procedure for a German aeroplane to show its tail whenever our aircraft hove in sight.

It was not to be expected for a moment that a people like the German, with their exceptional capacity for producing fine engines, would accept an inferior position in what to their alert perceptions is likely to prove the most important of the arms of war.

"During the latter months of winter and the early months of spring there was a notable deficiency of the enemy's airmen, till the appearance of a Taube became quite an event at any considerable distance from its own guns. Raids were made indeed, but they were always of a furtive character, and the determination to avoid combat was convincingly evident. In these months we were given to understand, by the ineradicable German inclination to boast about the future, that experiments were being made with new types of engine and machine, which were to result in the production of something superior to any craft that had ever taken the air.

"In the past month we have had an occasional opportunity for comparing the forecast with its fulfilment, and it must be admitted that the enemy has good cause to be proud of the advance he has made. Even from the ground one has been greatly impressed by the speed and climb of the German machines, which have penetrated lately some distance inside the firing line. It has been instructive to watch the daring with which our shells were dodged, proof of the pilot's faith in the engine he was handling, and the ease with which when he had had enough of it, he turned his nose towards the upper air and left the white trail of shells bursting helplessly behind him.

"The machine was of the Aviatik type, and may have been one of the new ones, said to be fitted with a 150 h.p. six-cylinder Mercedes engine. Aviation is not, of course, altogether a question of horse-power, no more than polo is of pony-power, but in the end it is the most horses and the best ponies which clear the way for a win. If your opponent is going to force up the horse-power you must not only follow him; you must surpass him. You must not only leave him behind in engine-power, but you must leave

he realised that his ears, not his engine, were at fault. Suddenly he heard a faint click, and immediately afterwards he could again hear the hum of his engine, which, he said, coming so suddenly, startled him quite as much, if not more, than the original explosion of the shell.

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Although most of his experience has been gained on high horse-powered, fast Sopwith machines, Mr. Hawker is quite equal to the occasion when it comes to flying an altogether different type, as he demonstrated up at Hendon on Sunday last when he went for a little spin in the little single-seater Beatty-Wright biplane on which Mr. Roche-Kelly has been giving his exhibitions of steep bankings recently. On landing, Mr. Hawker expressed himself very pleased with the machine, which was, he said, particularly easy to handle and quite quick on the controls. "ÆOLUS."

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him so far behind that, to beat you, he will have to design not only a new engine but a new machine to carry it. Only by such resolute methods can one hope to secure for a few months, the few months that may be all-important, that slight but decisive superiority in the air on which so much depends. It will be the old naval competition over again; ever more horse-power and more guns; only the out-dated types will drop out of use, must drop out of use, more quickly and more completely than could be the case on the sea.

"A danger might easily confront us from our disinclination to be rid of the obsolete. One would like to write a eulogy on the scrap-heap in war. It may be a hard saying, but it is better in war, even where there may be a shortage, to scrap everything that has outlived its uses. It is no good clinging to guns that are outranged, ships that are out-powered, or planes that are out-speeded. You will save life and lose nothing by being rid of them. The 'Blücher' lies at the bottom of the North Sea, a melancholy testimony to this disregarded principle. But horse-power in aviation means more than speed. It means carrying power. It means guns, or bombs, or whatever other weapon you may design for it. The twin-engined German machines with single fuselages, which produced such a sensation when they appeared over the French lines, were reported to carry, not a machine gun, but a much heavier weapon that fired shell.

"This may possibly be the one-pounder with which the Germans were experimenting some little time ago; but, from the accounts of its success, one would imagine that some form of case shot was what it was firing. 'Eye-Witness' has already given a description of a big German biplane with two fuselages, and an engine in each, the idea of which seems in great measure to have been derived from the Italian Caproni.

"That these machines constitute a new menace is not to be denied. It is possible that by means of them the Germans may be able to reach England, and make themselves mildly disagreeable. They might even prove to be those messengers from Heaven, for which out here we have been praying, to bring home to our country the realities of war. But there is no reason, for the present at any rate, to make a scare of them, as has apparently been done in some quarters. The new machines are undoubtedly worthy of all the admiration and respect which the French, no mean fliers, have accorded them. But it must be remembered that, in these comparatively early days of airmanship, it is possible to produce a machine too wonderful for any but the very best airmen. In the future power may be more easily controlled; at present it makes a very large demand on the skill of the pilot. It remains to be seen if the German airmen have made advances proportionate to those of the German designers. If they have not it will be difficult for them to do all that might be possible with their new machines.

"It may be, of course, that the engineer has solved some of the problems of control which still confront our designers; that he has been able to reduce the risks of high engine power when the earth has to be met. If so there would be a more formidable proposition to be encountered, but as yet there is insufficient evidence to that effect.

"We wait, indeed, for proof of fighting superiority, which the Germans are slow to furnish. Consider how, relatively, the matter stands. For nine months we have made reconnaissances over their territory, just as we pleased. It has been a mere matter of routine. Our airmen have done their daily round, above the German armies,

as casually, almost as unconcernedly, as one might go for a stroll in the Park. And for nine months the Germans have had to submit to it. They have watched our aircraft sailing as they pleased above their lines, impotent to interfere with them. Thanks to that impotence they lost a Zeppelin; thanks to it, possibly, no airship has been seen for long over London. On the other hand, what have the Germans done, even since the delivery of their new craft? They conducted a startling attack on the French lines, they have three times penetrated into Allied territory, they have at last attempted to interfere with our daily reconnaissance, and they have made several magnificent threats. That is not a long nor very notable list, considering the real superiority both in climb and speed that their new machines possess, and though it is likely that additions will be made to it we need not find them alarming.

"Being able to count on war, the Germans were able to accumulate a large reserve of aircraft, and, when their machines were proved inferior, they could devote all their energies to the invention of a new type. We, from a constitutional inability to believe in war, found ourselves when war broke out obliged to devote all our energies to production, and we had to shelve for the moment any advance in design. We had to pay for the failure of our rulers to realise the meaning of the new arm, and to establish it, at any cost, on a sound basis of British manufacture. The military authorities did all they could with the means at their disposal; but the men they had to face had been given the spending of four million pounds, and money talks, very loudly indeed, when you put it on aircraft.

"That we should be yet at the end of our troubles is not to be expected. Fate does not so easily forgive the fool; but if co-operation can be substituted for competition between home manufacturers, every week should put us on a more satisfactory footing. Hitherto, in aircraft construction at home every man's hand has been against his neighbour's; which may be well enough in peace time,

but in war a different principle has to be followed, and the only competition that can be permitted is emulation in self-sacrifice.

"One would add a word of warning as to the care with which all new ideas should be guarded from any sort of publication. From the reasons already given it will be gathered that we are not at present well placed to deal with novelties, and the inventor may easily grow impatient of the reception accorded to his ingenuity, and seek the publicity of the Press. But the Germans have shown such dexterity in adapting to a practical end even imaginative sketches published in this country that it is almost impossible to overdo precaution, and, like the oracles of fashion who jealously keep their latest 'creations' out of the shop windows, it behoves our clever young men to keep their models and drawings out of reach of the German eye, which searches every technical and illustrated paper in the hope of such gleanings.

"Meanwhile, let it not be imagined for an instant that we have resigned, or have any intention of resigning, the mastery of the air. Only the other day one of our unaccompanied pilots, challenged by three German planes, each of them with an observer, sent one to the ground within his own lines, brought down another for our men to capture, and drove off the third—no mean achievement with the odds six to one against you.

"Also, in spite of their new machines, which seem, by the way, to have abandoned the wing line of the Taube, the Germans show no increased disposition to face our men single-handed.

"They wait, high up, two or three together, for the chance of being able to pounce upon a lonely flyer; but they have done nothing yet which would suggest very great confidence in themselves or their machines. A young German airman in the early days of the war asked how he would know the British machines if he met them.

"'Oh, you'll know them right enough,' was the reply. 'They'll attack you.' The German can still count on that distinguishing feature."

AIRCRAFT AND THE WAR.

WRITING from the Eastern Mediterranean to the DAILY TELEGRAPH, under date July 16th, Mr. E. Ashmead-Bartlett said of the Turkish position at Quinn's Post near Sari Bair:—

"The Turk is taught before all else to keep concealed, so that his real numbers shall never be accurately known; but a short time ago, just when the Australians, chafing at their inactivity, were wondering if he was still on their front in any strength, he involuntarily gave himself away. One of our aeroplanes passed over his lines, flying very low. This was too much for the stolid Ottoman infantry, who, rising in their trenches, poured volley after volley at the intrepid airmen. It was then seen that every line of trench was fairly bristling with bayonets, showing the importance which the enemy attach to the position."

Mr. Stanley Washburn, writing to the TIMES from Warsaw under date of August 4th, said:—

"Across the Vistula hangs our observation balloon, while the sky is dotted with German aeroplanes soaring hither and thither amidst smoke puffs of bursting shrapnel from our guns. I counted 14 shells aimed at one aeroplane

"Meantime the German aeroplanes continue their senseless destruction of lives and property. On Monday many bombs were dropped, and it is reported that 25 people were killed. One bomb fell between the Hôtel de l'Europe and the new church, and others in all quarters of the city. . . .

"While I was crossing a bridge this afternoon four bombs fell on Praga, the suburb on the eastern bank of the river, making terrific detonations and sending the people in every direction."

In the Turkish *communiqué* issued on the 5th inst. there was the following:—

"An enemy aviator dropped bombs on Eznie, south of Kum Kale. A wounded man was killed. On August 3rd a cruiser and four torpedo boats appeared off Sighadjik Limin to the south of Smyrna. An aviator ascended from one of these vessels and dropped three bombs. One person was killed. The warships then fired 200 shells upon Sighadjik Limin. One house was destroyed."

Mr. F. Prevost Battersby, writing to the MORNING POST from the British Headquarters under date of August 6th, said:—

"Little happens that is new along the line of battle, but one feature has distinguished it during the last few weeks—it has been outlined, more or less roughly, by observation balloons. This is not the spherical captive balloon to which military operations in the past have accustomed us, but is shaped like an old fashioned pistol

with the handle hanging down and the muzzle nosing every change of wind. Londoners may, indeed, have made acquaintance with the type from having seen one floating as a guardship not far from the City. The chief advantage of the type is its greater steadiness for the observer, who occupies a not very enviable position when the enemy develops an inclination, as he frequently does, to bring down a balloon.

"These guardians of the air look rather impressive when one can see enough of them to follow the line of front over which they float, while, grimly watching them, showing faintly through the grey air, are their unlovely counterparts over the German lines. It is significant of the future, this lifting, as it were, of the frontiers into the air, where the battles which are to come shall be so ruthlessly decided; and one looks at these queer hulks, anchored in the airway, with the sense of seeing something which, though so new, has been superseded already, by man's mental processes, if not yet by his invention; and yet, seeing something that points the way to a fresh tension which is being devised for the undoing of humanity, a fresh apprehension which is going to be imposed upon it, which will make the horrors of the present war seem insignificant by comparison.

"It happened the other day that the enemy began shelling one of these ponderous creatures, which look like the apotheosis of some antediluvian monster, just as one was approaching it. One has grown used to seeing aeroplanes chased about the sky by anti-aircraft guns, and the airmen has always looked to have a fair sporting chance, though sometimes he might conceivably not be so regarding it; but to shoot at this helpless 'sitter' appeared to have about it no element of sport whatever. Though the range was, of course, considerable for the weapons used, which appeared to be ordinary field guns firing shrapnel, one felt from the first burst of smoke, five hundred feet beneath it, that the gun was certain to account for so tame a prey. It looked for all the world like some helpless kid tied out to draw a tiger.

"The world beneath the balloon quickly became excited by the bombardment. It came out of its houses and stared up into the air; foolishly enough, since, though the shrapnel bullets might fail to reach the observer, they were quite certain to return to the ground; and the road along which we were travelling, on which these people stood, was directly in the line of the enemy's fire; indeed, a fragment of shell from one of the first discharges ripped up the back of a horse browsing by the roadside.

"But this 'sitter' was not the soft thing it looked. Shell bursts would creep nearer and nearer, till it seemed a certainty that the next must split that frail envelope asunder. But the next would be wide by a hundred yards, perhaps, or hopelessly at fault in elevation.

"Had an aeroplane been present to register for the gunners, the

shooting would no doubt have been vastly different, since there is considerable difficulty in exactly determining how near a shell bursts to a floating target. But this was at a period when the German airmen were particularly shy of appearing where their presence might be challenged, and the gunner had to rely on his own devices. Though he failed to score a hit on the envelope, his bullets were evidently getting nearer than the observer liked, for presently the drum of the winder began to revolve, and the ungainly creature drew slowly nearer to the earth. As it descended the enemy's shooting became more wild, but it was sufficiently varied to send everyone who had been looking on at the match scuttling for a place of safety.

"An incident of another kind, which has happened recently, deserves to be added to the long record of fine things which our airmen have done, of which so few have, alas! been told us. The airman was engaged in one of those reconnaissances over the enemy's country which have become a mere commonplace routine of duty, and was a long way within the enemy's lines when an unlucky burst of shrapnel smashed his right leg to pieces. The shock of the injury, which was very severe, caused him to faint, and the machine, getting out of control, nose-dived towards the earth.

"So steep was the descent that the machine gun discs toppled out of the aeroplane, and the observer would have followed them had he not clung on to the struts, in that position not being able, of course, to render the slightest assistance to his unfortunate companion or to get control of the machine.

"It looked as like certain death for both of them as such things can look in the air, when the rapid passage through it revived the pilot. Had he not returned in an instant to the coolest possession of his senses, he would almost certainly have wrecked the machine, for at the fearful pace at which it was falling any but the gentlest pressure on the elevator would have been fatal. So exactly, however, did the pilot realise his perilous position in that instant of returning consciousness that he succeeded in checking gradually the headlong fall of the machine till he had regained complete control of it.

"He was then still in the enemy's country, and suffering agonies from his shattered leg, the bone of which was splintered; and with the very likely prospect of losing consciousness again, he might have been forgiven had he sought a landing. But such a surrender of the spirit never occurred to him. He shouted an inquiry as to the nearest landing place within our lines, and the observer pointed it out on the map to him. It was thirty-five miles away, more than half an hour's travel in the face of the sou'-wester, and he was losing blood fast.

"Yet never for an instant did his resolution falter. He would take no risks either, and though, of course, it considerably prolonged the journey, he rose to a safe height to cross the German lines, and made a perfect landing in spite of his damaged chassis, and waited to faint again till they lifted him out of his seat."

In the German *communiqué* issued on the 6th there was the following:—

"On the Western Front. Our anti-aircraft guns compelled four enemy aeroplanes to descend. One was burned, and another shot to pieces. On the coast a French seaplane, with its occupants fell into our hands.

"On the Eastern Front. Our airship squadron threw bombs on the railway buildings of Bielostok (40 miles east of Lomza)."

In the Austrian *communiqué* of the 7th there was the following:—

"The Italian airship Citta di Jesi, flying above Pola, was brought down by our shrapnel fire."

In the Berlin *communiqué* of the 7th inst., it was stated:—

"Our airships dropped bombs on the railway stations of Novominsk and Siedlitz."

Information was received in Amsterdam on August 7th to the following effect:—

"During an air raid by Austro-Hungarian airmen over Belgrade the central railway station was set on fire by bombs. A wharf and barracks in the southern part of the town are also said to have been hit."

According to a Nancy correspondent of the JOURNAL, the name of the aviator who, on the 6th inst., brought down a Taube flying over Nancy is Nungesser. He has already taken part in 53 air raids.

Writing from Milan to the DAILY TELEGRAPH on Sunday, Mr. A. Beaumont said:—

"On the previous day Italian airships had been particularly active. One dropped devastating shells on the Austrian military camp at Lake Doberdo, and another bombarded for the second

time the railway junction at Opucina, only some five kiloms. outside Trieste. All the batteries of Trieste opened fire on it, but it escaped their shells, returning safely to its headquarters, as did its companion dirigible operating farther north.

"A third dirigible, however, belonging to the navy, which about the same time dropped explosives on the naval port of Pola, met with a mishap on its return, and fell into the sea, and its small crew of three officers and three men were taken prisoners. This is the second airship lost by the Italian navy since the beginning of the war, but it must be remembered that the raids they attempted were exceedingly daring, and each time they had the satisfaction of having caused serious damage to the enemy's works.

"To make up for the loss of one dirigible the achievement of one which destroyed the railway junction of Opucina and interfered with the transport of troops and munitions from Trieste to Laibach and Gorizia were especially brilliant. Still more brilliant was its behaviour on its return, when attacked from above by an aeroplane, which tried to drop fire-bombs, for it put the Austrian war-hawk to flight with its own guns and returned safely."

The MORNING POST correspondent at Antwerp, writing on August 8th, said:—

"The recent raids by Allied aviators in Flanders have produced considerable disquietude amongst the German authorities at Antwerp, and an attack upon that town is feared. As a precaution the surveillance, both day and night, is very strict, and all approach to the forts within a distance of two or three miles is forbidden."

In the German *communiqué* of Monday there was the following:—

"Yesterday, near Dammkirch, early this morning at Schwarzenzen, near Ypres, at Gondrexange, and near Harboney, our battle aeroplanes brought down one French machine at each place. Two aeroplanes belonged to the squadron which bombarded the open town of Saarbrücken and the surrounding district, operations without causing any military damage but killing nine peaceful citizens and seriously wounding twenty-six and slightly wounding a great number."

The DAILY MAIL correspondent at Rotterdam, writing on Monday, said:—

"A new aerodrome is reported to have been completed at St. Denis, Ghent, where there are now about 100 aeroplanes. Many young Germans are being trained there as pilots."

In the German *communiqué* of Tuesday there appeared the following:—

"On the border of the Hessen Forest, west of Verdun, a French observation balloon was shot down.

"Between Bellingen and Rheinweiler (south of Mülheim, in Baden) a French aeroplane was forced to land by the fire of our anti-aircraft guns. The airman and the observer were taken prisoners.

"At Pfirt an enemy airman was forced by our fire to land on Swiss territory."

The DAILY MAIL correspondent at Rotterdam on Tuesday reported:—

"At ten o'clock this morning an Allied aeroplane dropped eight bombs on Bruges and damaged several buildings.

"A German waterplane, numbered 201, circled over the Flushing mail boat to-day. After recognising the ship it left for the Belgian coast."

Reuter's correspondent in Petrograd sent the following messages on Tuesday:—

"A Zeppelin dropped twelve shells and five incendiary bombs on Bifostok, where a woman was killed and a child wounded.

"Zeppelins also flew over the Kovel railway station, and dropped a few bombs. There was no loss of life, and traffic was not interrupted.

"There arrived to-day at Gomel in the Province of Minsk a Red Cross train which reported that it was bombarded by a Zeppelin on August 7th. One of the bombs dropped damaged two cars and killed two and wounded several of the occupants, among them a number of attendants. Two hours previous to this attack, at Siedice (midway between Warsaw and Brest Litovsk) another Zeppelin dropped bombs on another Red Cross train, killing a large number of wounded and wounding some of the attendants."

An official telegram from Berlin received in Amsterdam on Tuesday stated:—

"Yesterday morning, from six o'clock to eight, enemy aeroplanes attached Saarbrücken and Sanktingbert, which are outside the zone of military operations. From fifteen to twenty bombs were dropped on Saarbrücken, causing unimportant material damage only. At Sanktingbert eight persons were killed and two wounded."



ALL communications in connection with this section should be addressed to the Model Editor, *Flight*, 44, St. Martin's Lane, London, W.C. Correspondents are requested to write on one side of the paper only.

A Monoplane with Four Propellers.

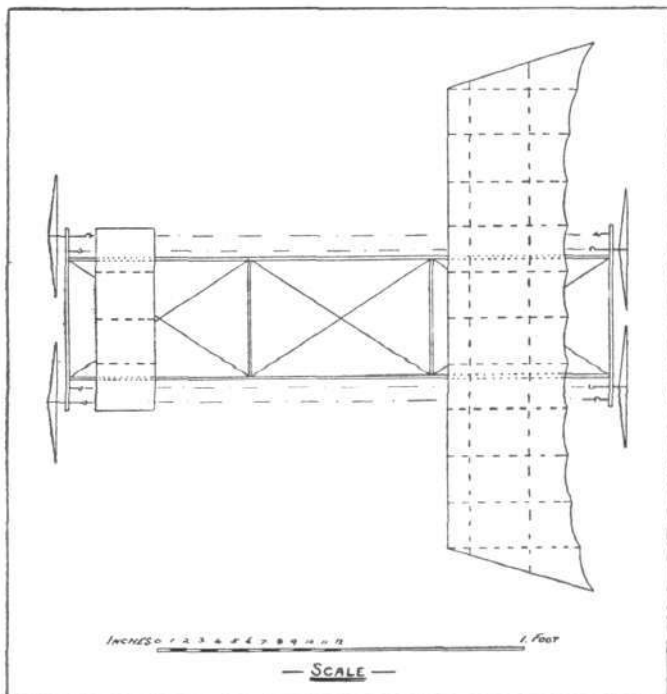
THE notes by Mr. V. E. Johnson in our last issue on the subject of models with more than two propellers have aroused a good deal of interest among the readers of this section, and Mr. W. V. Clemence, of Shortlands, Kent, has sent in the following description of a model with four propellers which he constructed and experimented with in September, 1913:—

"As will be seen from the drawing, the fuselage was of rectangular form, being constructed throughout of $\frac{1}{4}$ in. by $\frac{1}{4}$ in. silver spruce. The two longitudinals, which were 8 ins. apart, were 3 ft. in length; the propeller brackets were 1 ft. in length. All joints were nailed and glued, the whole finally being cross-braced with wire.

"The main plane, which was covered with Jap silk doped with one coat of varnish, was of the single surface type, and constructed of $\frac{1}{4}$ in. by $\frac{1}{8}$ in. birch; the ribs, which were placed 3 ins. apart, were steam bent to the correct camber. The span was 3 ft. and the chord 8 ins. at centre, and 10 ins. at tips; total area 300 sq. ins.

"The elevator was of the same construction as the main plane, and had a span of 1 ft. with a chord of 4 ins.

"All four propellers were 8 ins. diameter, and had the same pitch, namely 12 ins. No doubt the rear propellers should have been of a slightly coarser pitch owing to the fact they were working in the slip-stream of the two tractors. As will be seen from the drawing, the rubber motors were placed parallel to the fuselage longitudinals to prevent crossing them. Each motor consisted of 6 strands of $\frac{1}{4}$ in. strip elastic.



Mr. W. V. Clemence's model monoplane with four propellers.

"The total weight of the model was 13 ozs. The main plane was placed about 11 ins. from the rear of the fuselage, the elevator about 2 ins. from the front. The centre of gravity was situated about 1 in. in front of the leading edge of the main plane. Both main plane and elevator were originally made for an A frame twin-screw pusher model, which weighed about 9 ozs., and proved a very stable flyer, with an average duration of 20-30 secs.

"Upon altering the frame and placing the two additional propellers in front, there was no marked improvement in the duration, but the four-propellered machine was nearly twice as fast as the twin-screw machine. The stability was fairly good at the beginning of the flight, but was rather bumpy towards the end, owing, no doubt, to the vibration set up by the rubber motors when they began to get slack. I intend experimenting along these lines again."

Data From Model Experiments.

In connection with his notes on the subject of models with more than two propellers in our last issue, Mr. V. E. Johnson writes:—

"Looking back over the last five or six years of British Model Aeroplaning, one can only regret that the almost numberless experiments which have been made have not been made in a more systematic manner. The number of experiments which have been begun is (without any exaggeration) many hundreds; personally I believe it to be thousands. Again and again the writer has had sent to him accounts of experiments, which for all practical purposes were absolutely without value, simply because those who sent them drew conclusions from far too insufficient data. Five years ago the writer gave the following form of experimental data which should prove useful as a guide to serious workers:—

- "Weight.
- "Area of supporting surface.
- "Camber.
- "Aspect ratio.
- "Average length of flight in feet.
- "Maximum flight.
- "Time of flight, average and minimum.
- "Force and direction of wind.
- "Direction of flight.
- "Angle of inclination of main aerofoil to line of flight."

Material and Fittings for Model Workers.

One mistake which is often made by those who take up model aeroplaning is that it is a cheap form of amusement. They seem to think that any old wood will do for constructional purposes, while stray bits of wire and other odds and ends can be utilised for the necessary fittings. That is, however, a glaring example of the penny wise and pound foolish proverb, for the resultant "model" is bound to be not only clumsy, but is almost certain to develop weaknesses at most important places. If model makers are to get any real pleasure or useful information from the practice of their hobby, it is essential that they should use good materials and well-made fittings. These cost money, for the simple reason that the wood, for example, has to be specially selected, while fittings have to be made by trained mechanics. It will be found most satisfactory, and cheapest in the end, to deal with a firm who have had experience in this kind of work and know exactly what is required to suit the conditions.

Such is Messrs. J. Bonn and Co., of 97, New Oxford Street, London, W.C., whose work should be familiar to most of the regular readers of this section. They have just published a little catalogue, a copy of which should find a place in every aeromodellist's workshop. It contains particulars and prices of woods, propellers, gears, running wheels, elastic, winding gears, Cellon dope, bolts and strainers and all the other little items which go to make a model really complete and practical. In almost every case there is a wide selection to choose from. Thus, in the case of wood, silver spruce, ash and birch, straight-grained and free from knots, can be obtained in a variety of sections from $\frac{1}{4}$ in. square to 1 in. square, while special attention may be drawn to the special U, H and T sections, as well as moulded sections suitable for spars, leading edges and longitudinals. Apart from the selection of ready-made propellers, those who wish to carve these for themselves can obtain blocks of birch or satin walnut suitable for the purpose.

It is impossible to enumerate all the various fittings, but attention may be drawn to the ball-bearing brackets for either one, two or three skeins of rubber. These are beautifully made, the gears being accurately cut and they are very light. Another speciality which should prove very useful are the all aluminium disc wheels, which at 1½ in. diam. weigh only $\frac{1}{4}$ oz. for the pair and cost 2d. each.

A Model Club for Enfield.

Writing from 6, Lavender Road, Enfield, Middlesex, Mr. Alf. Newman says: "I am forming a model Aero Club for Enfield and District. I think that all people ought to be inspired with flying round this quarter of the globe; it is a common sight now to see from six to a dozen in the air at once down at the Naval Air Station, Chingford, so if people will send in their names as soon as possible I can get on with the organising."

To Assist the Minister of Munitions.

It was announced on Wednesday that the Minister of Munitions has constituted a Munitions Inventions Branch of the Ministry, and has appointed as Comptroller Mr. E. W. Moir, M.Inst.C.E. and M.Am.Soc.C.E. The Branch, which for the present is located in Armament Buildings, Whitehall Place, will have the duty of considering projects for inventions relating to munitions for warfare on land, or matters appertaining thereto.

In this connection a panel of honorary scientific and other experts have been appointed including Mr. Horace Darwin, Professor Glazebrook, Mr. F. W. Lanchester, Professor Vivian Lewes, Sir Hiram Maxim, &c., &c.

Rhodesian Aeroplane Funds.

A CABLE message has been received from Salisbury, Southern Rhodesia, asking the British South Africa Company to pay to the Imperial Government the sum of £1,500 deposited with the Treasury there by Colonel Raleigh Grey, C.M.G., for the purchase of a 70 h.p. aeroplane, as a gift from the people of Rhodesia for the use of the Royal Flying Corps and to form a unit of the Imperial Aircraft Flotilla. The aeroplane, it is requested, should carry the name "Rhodesia No. 1."

From Northern Rhodesia, through the Administrator, also came the intimation a short while since that certain Angoni chiefs in the Fort Jameson district had voluntarily subscribed £32 1s. as an expression of loyalty to His Majesty the King, the money to be utilised as a contribution towards the cost of an aeroplane for the British Army.

Aeroplanes from the Malay States.

UP to July 5th the Malayan Air Fleet Fund stood at £4,792, and the money had been sent over for three B.E. 2c biplanes. One has been provided by the Hon. Eu Tong Sen, Perak, the second by the residents of Kinta, and the third by Mr. C. Alma Baker.

Jamaica Also Providing Aeroplanes.

A FUND has been started in Kingston, Jamaica, with the object of raising £10,000 for the purchase of machines for the British Flying Services. A committee of well-known residents has been formed, and have issued an appeal urging that the commencement of the second year of the war should be marked by a special effort to complete the fund quickly.

And Some from Canada.

THE DAILY TELEGRAPH correspondent at Montreal writing on August 6th said:—"With the continued spread of the machine gun fever over Canada, it has been suggested by Colonel Wilson, commanding the Montreal district, that some of these subscriptions should be pooled for the purchase of aeroplanes, which are just as necessary for war as machine guns, while it is hard to secure a proper supply. His suggestion has met with considerable favour, and already plans are under way for the purchase of several aeroplanes in different parts of Canada."

U.S. Navy to Build Seaplanes.

ACCORDING to unofficial information from Washington, the forthcoming estimates of the U.S. Navy will include provision for the construction at the aeronautical base at Pensacola, Florida, of a plant for the building of hydro-aeroplanes, capable of turning out at least three machines a week.

Holland to Purchase Seaplanes.

INCLUDED in the estimates for the extension of the Dutch Navy, which were passed by the First Chamber on the 30th ult., was the provision for six seaplanes.

An All-Spanish Aeroplane.

THE IMPARCIAL, of Madrid, reports that trials have recently been carried out at the Cuatro Vientos Aerodrome, Madrid, with an aeroplane built by the military authorities to the designs of Capt. Barron, a Spanish flying officer. The only details available are that the biplane is in the form of an arrow; that the radiator and the propeller were manufactured at the Sres factory in Madrid, the 120 h.p. motor at the Hispano-Suiza factory at Barcelona, and the chassis at Bianchi. The trials were witnessed by King Alfonso, who congratulated the designer, and decorated him with the Cross of the Order of Charles III.

Spain Loses an Airship.

THE MORNING POST correspondent at Madrid on Tuesday wrote:—"Whilst the military airship 'Alfonso XIII.' was being inflated in the aviation park at Guadalajara an explosion occurred, destroying the airship and injuring an officer and eleven soldiers, five of the latter severely."

Double Fatality at Villacoublay.

MESSAGES received from Paris state that on Monday morning a biplane, while making a trial flight, made a forced landing in a cornfield near Villacoublay, ran into a haystack and overturned. The pilot, Lecqueville, and the observer, Soulat, died while being taken to the hospital at Versailles.

Armstrong, Whitworth, and Co., Ltd.

It is announced that Major-General Sir Percy Girouard has been re-elected a director of Sir W. G. Armstrong, Whitworth, and Co., Ltd., and Colonel A. G. Hadcock and Lord Sydenham have also been elected to the directorate.

An Adviser on Works Organisation.

HAVING recently relinquished the position of works manager to the Grahame-White Aviation Co., Ltd., Mr. George H. Mansfield has now taken offices at 17, John Street, Bedford Row, London, W.C. He proposes to specialise in giving advice on organisation and routine, especially in manufacturing concerns such as those devoted to aviation, &c.

M.A.B. Decide Not to Insure Against Air Raid Risks.

AT a meeting of the Metropolitan Asylums Board held on Saturday, a recommendation of the Finance Committee that the offices of the Board, &c., should be insured against aerial risks, was discussed, and it was eventually decided not to insure any of the property of the Board.

Fitters Wanted for the R.N.A.S.

It is announced that experienced fitters, with special knowledge of internal combustion engines, are required immediately for the Royal Naval Air Service. The pay is from 4s. a day, and all found. Applications should be made to the R.N.A.S. Recruiting Office, Brook Green Road, Hammersmith, W. Men engaged on Government work need not apply.



IMPORTS AND EXPORTS, 1914-1915.

AEROPLANES, airships, balloons, and parts thereof (not shown separately before 1910). For 1910 and 1911 figures, see *Flight* for January 25th, 1912; for 1912 and 1913, see *Flight* for January 17th, 1914; and for 1914, see *Flight* for January 15th, 1915:—

	Imports.		Exports.		Re-Exportation.	
	1914.	1915.	1914.	1915.	1914.	1915.
January ...	5,945	20,382	210	435	879	13,706
February ...	28,132	380	106	138	441	18,823
March ...	27,731	280	1,934	7,218	1,440	5,090
April ...	11,384	2,189	1,175	23,986	1,473	275
May ...	17,062	178	4,059	12,530	9,484	8,250
June ...	15,967	5,469	5,082	3,730	142	2,400
July ...	15,548	1,240	4,994	13,372	1,695	—
	121,769	30,118	17,560	61,409	15,554	48,544



Aeronautical Patents Published.

Applied for in 1913.

Published August 12th, 1915.

28,653. A. OISTER. Parachutes.

Applied for in 1914.

Published August 12th, 1915.

10,205. A. P. PLATES. Rotary I.C. engines.

10,882. BALLONHALLENBAU GES. Doors of airship sheds.

Applied for in 1915.

Published August 12th, 1915.

8. C. H. OCUMPAUGH. Flying machines.

The Editor is always pleased to consider articles or photographs suitable for the pages of **FLIGHT**, which will be paid for at the usual rates. All communications should be addressed to the Editor, **FLIGHT**, 44, St. Martin's Lane, London, W.C.

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